The Builder.

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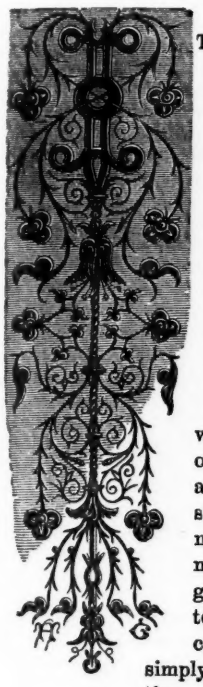
Progress at Wells and Salisbury.



IT is curious to note the change in the relative importance of some of our most celebrated cathedral and monastery towns in the present day, compared with that which they doubtless possessed in Mediæval times. To the modern architect, Wells is always in idea what some centuries ago it doubtless was in fact, one of the chief centres of interest in the south-west of England; but, on alighting at the small and unpretending railway-station which bears the name connected in his mind with one of the greatest marvels of architectural art, the impression conveyed is that Wells is simply a cathedral and a collection of subsidiary buildings of the Mediæval period, round which a few rows of small and mean-looking modern houses have clustered,—so disproportioned is the aspect and size of the former to that of the town which partially surrounds them. So capricious, indeed, are the influences regulating the growth and progress of towns, that while Bath, which formerly found it necessary to enter a doubtful claim to episcopal honours in opposition to its then superior rival, has grown into a large and important place, Wells seems to have remained positively almost stationary,—relatively to have far retrograded. The streets themselves offer little to detain the architectural visitor eager to reach the cathedral, the west front of which can at present be studied with a minuteness not generally possible, by the aid of the scaffolding erected for the repairs, which, while of course marring for the present the general effect to the eye, furnishes as a compensation the means of gaining close access to the wonderful and almost inexhaustible sculpture and decoration with which it is covered.* After the interesting account of the front lately brought before the Institute by Mr. Ferrey, the greater part of which, at different times, appeared in these columns, it is unnecessary just now to draw attention to, or describe anew, the general design which runs through this great assemblage of architectural sculptures; but a word or two as to the impressions produced by the close inspection which is rendered possible at present, may not be uninteresting to those who have not the immediate opportunity of visiting the cathedral in person. In regard to the general skyline of the centre portion, it has been before said, and on the whole correctly, that it is somewhat unsatisfactory, and even inelegant. In regard to the details of the structure and design, the feeling left on a close examination is, that the whole achievement is more remarkable even than has been hitherto recognised. In regard to quantity of work alone, perhaps only the inspection of the several stages of the design at close quarters, from one scaffold to another, can enable any one fully to realise the intricacy and richness of the work undertaken, and the admirable and precise manner in which all its details have evidently been worked out, notwithstanding the present dilapidation of many portions. These dilapidations are most conspicuous in the caps and shafts of blue lias, of which the former are, in many places, reduced to mere shapeless rags of stone, while the few of the latter which are left, are not only disintegrated on the surface, but, in one or two cases, actually *bent*, like a wrought-iron bar under a heavy blow. Of the statues, those on the south sides of the buttresses seem to have stood best. The last of the row of angels in particular, in one of the upper tiers, which is so placed, is in comparatively good preservation, while all the rest in the same tier are wofully defaced by weather. The statues of saints, kings, and bishops, &c. in the lower tiers, while presenting much that is dignified in expression and pose, belong to the comparatively stiff conventional type usual in ecclesiastical work of the period, and may be regarded rather in the light of architectural embellishment, not without some degree of archæological interest also. The main interest of the artist will always be centred in the remarkable tier of alto-reliefs, about half life size, which runs right across the front and returns round the towers, near the top of the composition, and represents the dead starting, naked and astonished, from their tombs, at the sound of the last trumpet. Here we have no conventionality, no ecclesiastical rigidity of type: here we have before us the genuine attempt of some gifted Mediæval artist to do all that he could with the human figure as a medium for the expression of passion, despair, and exultation. In regard merely to mechanical execution, the spectator accustomed only to the more usual Mediæval developments of the art of sculpture cannot but be astonished at the freedom of treatment, the energetic action of the figures, and even the degree of anatomical correctness in many points; speaking comparatively, of course. But more remarkable than this is the variety of conception and the intensity of feeling evident as underlying the whole work. Whoever was the sculptor, he had felt in his inmost soul the influence of that belief in a *Dies Iræ* which formed such an awful background to the Mediæval theology; and as we contemplate this array of figures, one looking joyfully up from the tomb from which he has thrust away the covering, another with an expression of simple wonder at the vision which has roused him from his long sleep, a third leaning his head on his hand in the deepest dejection, another tearing his hair, another with arms folded in the doggedness of despair, we involuntarily recall the lines from the great hymn of Thomas of Celano:—

> *"Mors stupebit, et Natura,*
> *Quum resurget creatura*
> *Judicanti responsura.*
>
> * * *
>
> *Quid sum, miser, tunc dicturus,*
> *Quem patronum rogaturus,*
> *Quum vix justus sit securus?"*

Passing from these greater considerations to more strictly architectural details, we may notice the remarkable vigour and largeness of manner in the carved foliage of the caps throughout the work, which overhang the bell more boldly than any we remember to have studied; and the freedom and beauty of the carving which fills the spandrels between the arches. We hear much now-a-days, and rightly, about combining Classic purity of form with Gothic vigour in the treatment of detail. If any one wishes to see how this can be accomplished, let him examine minutely the foliated ornament on the west front of Wells. The student of masonic design will not omit either to take the opportunity of noting the construction and jointing of the masonry from which all this elaborate decoration is worked, and the depth and boldness of the mouldings; the whole of the foiled arches, for instance, over the figures we have been mentioning, being drop arches, undercut, and moulded behind with a deep hollow, where no one can possibly see the result of all this labour.

The work on the front, up to the date of our visit, had proceeded only as far as the fitting up of some portions of the masonry of the arcades and strings with new stone, and the renewing of a considerable part of the work, including a complete statue and niche, on the upper (later) portion of one of the towers. The earlier statues, we understand, are not to be touched, at present at least. The new stonework we found mostly not set permanently, but wedged up into its place, waiting for a sufficient supply of the shafts of Kilkenny marble, which is to supply the place of the perishable blue lias, being much of the same tint and appearance when used (as it is) simply sanded, and not polished. We do not see grounds for Mr. Ferrey's remark, that the lias had "stood remarkably well in sheltered corners:" it shows extraordinary decay in some interior portions of the building, where it really looks more like cracked and rotten wood than stone. On the other attractions of the cathedral we need not now dilate, but may mention *en passant* the new and very beautiful organ, by Willis, not too large or noisy, recently erected. The bishop's palace, with its moat and drawbridge and picturesque irregular outline, is, of course, not to be passed over, as one of the finest pieces of ancient domestic architecture in the country. Of what has been recently done there we gave some account a few weeks since. The Church of St. Cuthbert is worth attention for its tower,—a good specimen of one of the characteristic types of late Somersetshire tower; and on the rising ground behind the Cathedral the new church of St. Thomas, with its adjoining rectory, may claim a word as a pretty and picturesque, if not very powerful, design. A walk up the hill rewarded us with a view of the outline of the cathedral and churches dark against a perfect flood of western sunlight, filling the sky and illuminating with a misty glory the successive reaches of hills beyond—a truly English scene. A parting glance at the cathedral as we descend suggests the reflection that, whatever some theorists may say, this west front was the design of one independent and original mind; that it did not grow "of itself" under the hands of a masonic clique; that it is as truly and distinctly an individual artistic conception as a symphony of Beethoven's or a poem of Tennyson's.

Perhaps this feeling as to the individual character of Gothic architecture is not diminished by a comparison of the front of Salisbury with that of Wells; so near in date, similar to some extent also in the general arrangement of the sculptured decoration, yet so weak and mannered in comparison, both as to general composition and details. Let the student who wishes for a lesson on the value of breadth and largeness of execution in architectural ornament, contrast the capitals in the front of Salisbury with those before mentioned at Wells, and "make a note" of the distinction. Very elegant and delicate, certainly, are the former, but very weak withal by comparison. The strong point of Salisbury is its completeness and unity as an architectural composition externally; fortunately emphasised and shown to advantage by the large expanse of lawn which surrounds the building. No one visiting Salisbury Cathedral for the first time could make a better approach to it than by entering the green from the north-east angle, whence the

* It may be as well to mention, to prevent disappointment on the part of any of our readers who may visit the cathedral, that strict orders have been issued against the admission on the scaffold of any strangers, without a written permission from the architect for the restoration. This permission, we have no doubt, would be accorded to any one wishing to visit the building for purposes of study.

whole pyramidal composition groups itself to perfection. Should he come to this point, too, at the moment when an early sun is throwing the long shadows of trees right across the green from side to side, let him appreciate the value of level lines in the foreground of a picture in giving emphasis to a vertical composition in the rear. The modern statues in the niches of the west front, by Mr. Redfern, will repay attention: that of St. Sebastian, among others, is a very successful and pleasing design. The architectural restorations here have been executed in Chilmark stone, the shafts being replaced in grey Devonshire marble.

The work of restoration at present is concentrated on the interior of the Lady Chapel, an important part of the work being the repairing of the red Purbeck shafts, which have decayed in many places to almost a spongy softness and brittleness, chiefly owing, in all probability, to the action of condensed moisture in the colder seasons. Where these shafts are but partially decayed, the bad portions have been cut away, and their place refilled with a new piece. This has been carefully done, so that the patching is only perceptible on a close inspection, and even then might be missed by any one who was not aware of it. The brass rings, formerly gilt, which bind the jointing of the shafts half-way up, it is proposed, we understand, *not* to regild; if so, they will have rather a shabby appearance, and it seems better, as they are there, to recognise them as a source of decoration; the gilding will tell well on the brownish red surface of the marble. The vault, with its "tufa" filling, has been re-pointed and re-cemented where decayed. Is it known where this light, porous, volcanic-looking material (for so it appears when uncovered by cement) was brought from? It seems to have answered its purpose as a filling material for the vault admirably, both as to lightness and durability. An ascent of the tower reveals the amount of solid labour which it has been necessary to expend in strengthening and replacing the masonry, especially at the angles, visible in ascending the stair turrets, where much of the old and not very well bonded work has been cut away and replaced with masonry in larger stones well bonded and wedged up, and having all the appearance of a solid piece of work. In the upper stage of the tower a number of wrought-iron diagonal ties, from corner to corner, have been inserted; and in the centre of each of the two internal arches on every face a massive supplementary stone centre mullion, concealed from outside view by the louvres, has been built up to the crown of the arch, which, together with the iron ties inserted across the springing, will probably be sufficient to prevent for the present any more of the threatened settlement from the weight of the spire. That so lofty a stone spire was not contemplated in the original design seems almost evident on examining this stage of the tower; if it were, very insufficient provision was made for so great a superincumbent weight. We spoke not long ago of the interior effect of the chapter-house, the windows of which have been filled with stained glass of a very admirable style both as to design and colour; the design consisting mainly of geometric diaper, with a few small figures in medallions, and the colour for the most part very subdued and delicate. The key-note of this glass design would almost seem to have been given by a window put up a generation back by a local artist, in the south transept; a window which is bad in colour, certainly, but which in general design shows a very clear perception as to treatment of stained-glass design. It is a pity that the lower portion of the chapter-house cannot be said to afford the same satisfaction as the tier of windows above; here, as our readers know, the quaint frieze of Old Testament subjects, in the spandrels of the ground-story arcade, has been painted in heavy colours, and the capitals below are overdone with gilding and masses of colour.

Those who like to note the architectural or the building peculiarities, however slight, of different localities, may observe the *penchant* in Salisbury for hanging out from the first-floor stories of houses, bay-windows with a flat boarded soffit, without the slightest indication of bracket or corbel to carry them; an omission which converts what would otherwise be a picturesque feature into a very ugly one. Still less pleasant reflections are suggested by the dirty and ill-kept state of some of the streets; foot-walks, outside the gates of respectable houses, consisting of nothing but a bank of clay, and such other phenomena; things which are a reproach to any people. The Church of St. Edmund, though very late in style, is worth a glance for its rather unusual proportions: low but with very broad aisles, and a general open and unencumbered appearance in its nearly square area, very suitable for a place of congregational worship: the church only requires a new roof to the nave (the present being a very poor one) to present rather a striking and characteristic interior. A good east window, by Clayton & Bell, and some mosaic decorations in the reredos by Salviati, are among the adornments of the chancel. Those who love the scenes where good men have lived and laboured, never omit the pilgrimage of a mile and a half or thereabouts, out to the little church at Bemerton, associated as it is with the name of one of the most refined and truly "gentle" men of whom England keeps record. Adjoining the little flint-built church, scarcely larger than an average drawing-room, is the parsonage in which "George Herbert's study" is still shown. A stone's-throw off is Mr. Wyatt's new church, which has been before mentioned and illustrated in these columns, and of which therefore we will but observe that the good taste and effectiveness displayed in such decorations as the incised figures on the aisle walls and the pleasing style of grisaille glass with which many of the windows are filled, render it the more difficult to imagine how the east window came to be filled with such unmentionable stained glass: a chromatic fantasia in claret-colour and other abominations, by which the designer, whoever he be, has imperilled his soul, and to which no sort of pardon shall on any terms be extended.

COLONEL SCOTT ON LIMES AND CEMENTS.*

THE quantity of carbonate of lime extracted from sea-water by the oyster is as nothing compared with what is done by the coral. It is an undoubted fact that the low islands in the ocean consist of nothing else than the works of the coral animal. Although only a feature of the Indian and Pacific oceans, the area which coral islands occupy is scarcely to be credited. The coral reef west of New Caledonia extends for a distance of 400 miles; the great Australian reef has a length of 1,000 miles. Millions of men dwell upon the decayed calcareous shells of these animals, and Darwin speaks of annular reefs of coral islands, with perpendicular walls of 300 ft. Coral limestone, indeed, is the material employed for the mortar of the Bermuda Islands and Malta among our own possessions.

But the oyster and the coral are not the only animals employed in building new continents. Ehrenberg has made it clear that the presence of visible petrifactions in some, but not in all, limestones, is by no means a proof that other limestones without such visible signs of life have not been constructed in the same manner by creatures too small to be seen by the naked eye. In fact, all European chalks consist of microscopic animals with calcareous shells, and others with silicious shells; and this brings me to the question of what becomes of the silicic acid which we left suspended in the sea-water.

The organic agency which in such a wonderful manner brings about the abstraction of the carbonate of lime it contains, likewise removes the silicic acid. Most of the microscopic marine forms hitherto observed are silicious. Silicious organisms have in byegone days existed in such quantities that beds of earth, many fathoms in thickness and miles in extent, are made up of them. The so-called mountain-meal of recent formations, the Bilin polishing slate of the tertiary period, and a considerable proportion of the bulk of the chalk formation, are all due to their agency. It is to their presence in chalk marls that the limes made from the lower chalk owe their hydraulic properties. Ehrenberg, who made these animalcules his special study, calculates that in a pound of chalk there are upwards of ten millions of nautilæ, being upwards of one million in each cubic inch. There are placed round the mouths of these animalcules, hairs so disposed that a whirl can be produced which brings the food which the water contains within the reach of the creature, and at the same time assists its progression. Their bladder-like stomachs also present a large surface for the absorption of water, and separation of its constituents. By this means an enormous quantity of water, far exceeding that which the oyster swallows, is enabled to pass through these infusoria. The nautila must consume—supposing it to extract the whole of the silica contained in the water—33,333 times as much water as it weighs, and this, remember, when the duration of its development does not continue beyond twenty-four hours. This is much as if a man weighing 150 lb. passed through his body in twenty-four hours five million pounds of water, *i.e.*, 1 cubic foot per second,—a quantity sufficient to drive an overshot wheel.

But the power of increase of these creatures is more astonishing than their powers of imbibition and secretion. Ehrenberg observed the *Hydatina senta* for eighteen days, and found that such an individual can multiply itself fourfold in twenty-four hours. It can during this time develop four eggs, or in ten days forty eggs; and if no obstacles intervene, and all its descendants are equally fertile, on the tenth day there would be a million of individuals from one parent; on the twentieth, a billion, and in a month a trillion, and so on. But something more surprising than this remains to be told. The same observer found that another animalcule, the *Paramœcium aurelia*, during its life of several days, could, in the course of one day, divide itself into eight individuals by simple transverse partition; and as these individuals increase by eggs as well as by partition, and these eggs are deposited, not singly, but in masses, it follows that the possible increase of a single individual in two days' time must be so enormous as to be incapable of being expressed in numbers. "Dr. Carpenter," says Sir John Herschel, "computes the progeny of a pair of aphides, if allowed to accumulate, at the end of one year, a *trillion*. Granting the reproduction of marine animalcules to be *a thousand billion times less rapid* than that of aphides,—granting that each of them during its life time (supposed not interfered with, and food supplied) secreted only a ten-millionth part of a cubic inch of indestructible calcareous matter, we should find accumulated, in less than a quarter of a century, a globe of such material, whose diameter would exceed the distance travelled by light since the ordinarily received epoch of the Creation (4004 B.C.), and the surface of the globe supposed to continue increasing at the same rate, would then be swelling out into space a great many thousand times faster than the speed of light."

Nature doubtless bestowed upon them this marvellous fecundity to provide against their extinction, forming as they do in countless numbers the food for larger animals. If they were not exposed to many casualties, a single animalcule of the Rotifer kind could in one month, by means of its descendants, form a bed of silica twenty-five square miles in extent, and about three-quarters of a foot thick.*

Here, indeed, is a minimum form of existence, and a maximum effect resulting,—the greatest results produced with the smallest expenditure of means. Archimedes declared that, give him a lever long enough, he would move the earth; we can say that, give us a mailed animalcule and an ocean large enough, we will in a short time separate from it the whole of its lime and silica and build one.

In no case can the insignificance of the means by which the Creator works, and the immensity of the effects produced, be greater than in that of the infusoria, which form the material from which we derive so common a substance as that which I have undertaken to treat of in the present lectures.

As it is to the calcareous silicates that we must trace the origin of all the carbonate of lime upon the earth, so it is the magnesian silicates to which we owe all the carbonate of magnesia, a substance sometimes found in connexion with carbonate of lime, as in dolomite (in some parts of the country largely used for lime-burning), and sometimes occurring alone, as at Madras, where it has been extensively used for water-works. But silicate of magnesia is much less destructible than silicate of lime, and it exists only in small proportions in the skeletons of infusoria; on the other hand, it exceeds the quantity of lime in marine plants, and I must not omit to point out that vegetable as well as animal life is conspiring to the re-arrange-

* See p. 140, *ante*.

* Such a stratum is actually now in course of formation at the bottom of the Atlantic Ocean, recent soundings clearly proving to us that a vast bed, of what may in time be consolidated into chalk, is now being deposited over a surface many thousands of square miles in area.

ment of the solid constituents of the globe in its rocks and deposits. While, however, they both concur in removing from the ocean its mineral substances, these two agencies separate the two minerals, lime and magnesia, from one another. The carbonate of lime, as well as the carbonate of magnesia, is thus subjected to a wonderful circulation. The marine animals and plants separate them from the sea-water, and protect them from its dissolving influences. In this way calcareous sediments are formed, and perhaps after a time elevated above the surface of the sea. Then the organic matter is gradually destroyed, the carbonate of lime is again exposed to the solvent action of the acid-laden rain-water, and is thus removed and carried back to the ocean to renew the same cycle of changes.

I have now dwelt at considerable length on the mode of formation of the minerals which, when calcined, furnish us with our various limes and cements, and I may now pass on to the chemical processes which the preparation of these substances involve. Limestones consist mainly of carbonic acid and oxide of calcium or lime. If we look at the table (see p. 140), we find that carbonic acid is represented by the symbol C O_2, or two parts of oxygen = 16 combined with one part of carbon = 6, total 22. Oxide of calcium, symbol C O, consists of one part of calcium = 20, combined with one part of oxygen = 8, total 28. If we put carbonate of lime into the fire, and expose it to a red heat, the carbonic acid is expelled in a gaseous form, and we have a residue of pure lime. If I take the same carbonate of lime and expose it in a vessel to the action of acid, the carbonic acid is also expelled as carbonic acid gas. The oxide of calcium, or lime resulting from the calcination, is a white substance, highly phosphorescent under heat, and possessing a great avidity for chemical combination with water. When water is added to the quick lime, a union of these substances takes place with the evolution of heat and a more or less considerable change of form and bulk in the lime. We have, in fact, a new substance produced, called hydrate of lime, which is a bulky powder which may occupy from two to four times the space of the original lime. The oxide of calcium, CaO, takes up one equivalent of water, HO, and becomes CaO, HO = 37. When this hydrate of lime-powder is mixed with water and made into a paste, with or without the addition of sand, SiO_3, the resulting mortar gradually dries and hardens, and in the course of ages the carbonic acid gas of the atmosphere expels the water from the hydrate, and replaces it, forming a carbonate of lime. This is what takes place in the case of what are known as pure or fat limes; but, as the quantity of carbonic acid in the atmosphere is very minute, and does not, except after very long-continued exposure, penetrate to any great depth below the surface, it follows that mortars made from such limes never properly harden and give good results. It is often thought that hard and dense limestones, such as the mountain limestone, give the strongest and best limes. This is not true as regards the builder, though the resulting material may be good for the smelter, the soap-boiler, and the candle-maker. Alberti, who devoted much attention to the subject of limes, asserted that some lime, more than 500 years old, which had been found in a pit, was, on its discovery, "still so moist, well-tempered, and ripe, that not honey or the marrow of animals could be more so!" It is stated by Jahn, that in the ruins of the Castle of Landsberg a considerable quantity of lime was discovered in a cellar, where it had been more than 300 years, which was apparently in the condition of freshly-slaked lime, only a little more dry. From these facts it must be evident that, if lime protected from the atmosphere remained so long without becoming consolidated, it is useless to expect good results from pure lime such as these clearly were. General Treussart sums up his opinions on this subject in the following pithy way:—"Thus chalk-lime mortar, when wet, is a pulp or paste, and when dry it is little better than dust."

Breweries.—In connexion with our remarks on breweries, we mention that at the next ordinary meeting of the Society of Engineers, to be held on Monday evening, 6th March, in the Society's Hall, Westminster Palace Hotel, a paper will be read on "The Machinery and Utensils of a Brewery," by Mr. Thomas Wilkins.

A REVIEW OF THE ARCHITECTURAL MUSEUM.

ON Saturday last, the Architectural Association paid a visit to the Architectural Museum, Tufton-street, Westminster, and Mr. J. P. Seddon lectured on the collection of casts.

Mr. Seddon said that his object was to bring before architectural students the varied treasures of the Museum, and to render them more generally known than, he was sorry to say, was the case at present, and the goodly gathering before him gave him hopes that, to a certain extent at any rate, that object would be achieved. He regretted that it was necessary he should have to assert that the collection he was about to describe did possess varied and valuable treasures; yet remarks that he had lately heard made by architects, of whose opinions he had the highest regard, to the effect that the Museum contained a heap of rubbish, warned him that he could not take the position he desired as proven. He felt, however, that he should have little difficulty in showing his audience that the general character of the casts which the Museum contained was anything but rubbish. It was fortunate that nowadays men were not given to mince their words, and vigour was to be admired, even if it sometimes overshot the strict bounds of propriety and verged upon those of exaggeration. He did not suppose the remarks referred to were literally meant; still, their purport was that the speakers' particular views were not sufficiently catered for, and therefore, on behalf of the authorities of the Museum, he felt bound to point out the fallacy they involved. The Architectural Museum and its contents, as it stood, had cost not less, in one way and another, than 5,000*l.*, and it had only been established after years of unremitting and painstaking labour on the part of its secretary, Mr. Clarke, and the council generally, and yet now he often heard it alleged that one error or another marred its efficiency. First, that the locality was undesirable. Now it had been chosen partly with the view of accommodating the class it was designed to benefit,—carvers and art-artizans. Unfortunately, that class did not yet seem to avail themselves of its advantages. But it was early days yet, and the existence of the Museum not sufficiently known to them. Then, no one probably was aware as well as the council how difficult it was to find sites in the centre of London, within such means as they had had at their command. At any rate, here was the Museum, and the cost of merely fixing the casts upon the walls had amounted to hundreds of pounds, and therefore it seemed foolish to talk wildly of removing it, and far preferable to try and make the best of it where it was. Another reason he had heard given for it not being used as it might be by students, was, that they thought it far better to study carvings in the actual positions for which they had been designed, and not from casts which were imperfect. This certainly could not be denied; yet there was one great benefit conferred by the Museum which could not be got elsewhere, and that was the readiness with which the work of various localities and styles could be compared. And if some of the casts were not so good as they might be, they still had value as parts of such a sequence, and might, and no doubt would, be gradually supplanted by better ones in time. On the whole, he thought that such complaints as these might be dismissed, as those of bad workmen who grumbled at their tools; and as he trusted his audience was composed of better stuff, he would proceed without further preamble to a description of what was before them. It would be found on examination that the distinct types of architectural ornament were but few, and had been handed down from remote ages with less variety of treatment than at first might be supposed. Thus the refined Greek had clearly its parentage in the ancient Egyptian and Assyrian, and in its turn was copied by the Roman. And after the convulsions which caused the overthrow of the empire of Rome had subsided, the same elements were re-used by the founders of the various Romanesque styles and the artists who in Byzantium still worked after Oriental traditions. The Museum had some fine examples of Classic work belonging to the Institute of Architects, but its collection was mainly composed of the later Mediæval styles. Some fine Romanesque capitals, however, showed by their interlaced ornaments carved on their surface, and not growing out of them, the character of work which had spread into the various countries from the Byzantine influence. The Gothic of France never freed itself so thoroughly from these traditions as did the English, and with the square abacus carried quite late into the style, the conventional horns reminding one of the Corinthian scrolls, and even the Ionic volute and the acanthus remained almost throughout the principal type of the foliage employed in it. Whereas in England, as the Early English style became a distinct and complete one full of admirable and quite local characteristics, so was the Early English foliage developed into a perfect style of its own. The museum was remarkably rich in the carved work of this date; and some recent additions, in the shape of some casts of capitals from St. David's Cathedral, were most valuable, as showing whence and how this class of work arose. This was not from the Byzantine class of Norman ornament, but from the cushioned Norman capitals, on the face of which at first trefoil-shaped leaves were cut, and at last they budded into foliage of the freest character, although the cushion element still mingled among the leaves in a curious fashion. A magnificent series of capitals and corbels from Llandaff Cathedral were next pointed out, as being perhaps the finest examples of Early Gothic foliage in existence, so free and perfect, and with so little reminiscence of their Norman origin, that it was only by reference to the earlier transitional St. David's work that it could be seen whence this was derived. This Llandaff work seemed the perfection of stone foliage, with the idea of strong vegetable growth, bold and free lines, perfect modelling of leaves and stems, full of gradation and lovely lines in every part. The next series of Early English capitals, though beautiful in their way, were more conventional, and far inferior in the above-named characters. These were from the East Anglican churches, such as Ely and St. Alban's. Another group from Westminster Abbey and Stone Church might be considered as intermediate. The freedom of design and arrangement of their stems in spandrels were admirable and decorative, and the leaves broad in treatment and playful in detail, the trefoil not so rigidly adhered to, but three-lobed, irregular-shaped leaves, some with trefoiled ends, abounded. A fine cast of the capital of the central column of the Chapter House found at Westminster, was pointed out as a curious example, the detail being very quaint if closely examined, but the effect poor from the height at which the original is fixed, though piquant, being executed in Purbeck marble. Here, it was remarked, was an example of the value of this museum, in that its galleries permitted of a close examination, impossible hereafter to be attained in the Chapter-house itself. One bracket from Wells Cathedral was described as fine in general design, but inferior in treatment of the leaves and stems to those of Llandaff, which it generally resembled. Some very fine and boldly-treated Early English foliage of another type was pointed out as coming from and characteristic of Lincoln Cathedral. In leaving this class, Mr. Seddon insisted on the necessity that whatever leaves were adopted, they should bear examination, and look as if, gathered and pressed, they would be symmetrical and perfectly formed throughout; and with regard to the stems, that great care should be taken to secure a good contour of moulding in every direction, and continued and delicate gradation in their projection, a point which is often lost sight of in French work, where effect at a distance is sometimes coarsely sought. Among the Decorated work in which the conventional character is superseded by a naturalesque one, and the foliage no longer seems to grow out of the stone columns, but to be rather bound round and attached to them, some beautiful examples from Southwell Minster were pointed to and compared with examples from St. Ethelred's Chapel, in Ely-place, Holborn, which are, though vigorously, coarsely sketched, like some of those figured in M. Viollet le Duc's book, and which consequently Mr. Seddon thought might have a French origin. Quite another class is that from the lady-chapel at Ely Cathedral. This looks as if it had been elaborately conventionalised from crinkled cabbages; yet even with all its elaboration truly drawn, each leaflet is traceable, with its fibre to the stalk, and not a mere nobbled pretence, such as a modern carver would make of it.

Passing to still later or Perpendicular and Flamboyant work, Mr. Seddon said he could hardly follow Mr. Ruskin in what he thought his rather over-strained and sentimental notion as to its having taken dead and shrivelled leafage as a type. Certainly it was clear that Early Gothic carvers affected and copied the bud rather than

the flower, and the vigorous shoot of spring pushing out of the ground than the fully-fledged and opened leaves of summer. Thus the Middle Gothic carvers revelled, without doubt, in the perfect foliage of the vine, the maple, the oak, and the other trees of the forest; and the later Perpendicular carvers rejoiced in the tumbled and crumpled, and often nondescript, leaves, with reversed curves, as they did in their mouldings; but they took also for types other plants which seemed to serve their purpose, and gave vigour enough often to the thistle and its spines and scooped hollows, the sea-weed, with its fanciful arboration, and put plenty of life into them. Occasionally they twisted their stems about like limp maccaroni, and lost nerve in mere ornamental nonsense. The style was then in its decay, and there was little left to grieve about. Of Renaissance work the Museum has much valuable work from Venice, the gift of Mr. Ruskin, from the Doge's palace, very able, and full of fine curves and subtle modelling, but reminding one of the Classic, the type of which they had reverted to,—the acanthus-leaf, but without the rigidity of the ancient examples,—beautiful to look at, but not good examples for study, as not being clear and defined, or true and precise in outline, like the Early Gothic. In conclusion, the speaker said he thought he had shown his audience that the Museum contained a store of fine architectural ornament for them to study from, and it was a collection which, from its very nature, must grow, and was capable of being weeded out and improved almost *ad infinitum*. It was simply laziness, ignorance, and prejudice, therefore, to ignore or despise it; and possessing in his friend, Mr. Wallis, a curator and teacher of drawing, who was intimately acquainted with its contents, and able and willing to assist students in copying them, he hoped that the art classes that had recently been established there would be suitably attended. Unfortunately, it was no secret that a debt of some magnitude still hampered the authorities, and their efforts to overcome this were often met by queries as to it being worth the exertions made on its behalf,—queries founded upon an assumed indifference on the part of students to make use of its treasures, and which it behoved them, therefore, speedily to set at rest.

A vote of thanks to Mr. Seddon for his address having been moved and seconded, and passed by acclamation, the meeting broke up.

WOOD-WORKING BY HAND AND BY MACHINERY.

THE triumphs that have been accomplished during the last fifty years in the practical application of science in mechanics and manipulative processes, in almost all departments of industry, are more numerous and marvellous than have marked any previous half-century in the world's history. They have been alike notable in the domains of textile, metallic, fictile, and other manufactures, and in means of transport and communication. The period embraces the introduction of the railway system, of the electric telegraph, of steam navigation, and of the penny, latterly of the halfpenny, post. In metal-working an enormous saving has been effected, in money and labour by the introduction of machine-tools, and, not only so, but work has been undertaken and carried through successfully that would not have been attempted by the old methods; as witness the forging, boring, and turning of the "Woolwich Infant," as the 35-ton gun has been named. In textile manufactures, to take the single branch of cotton goods alone, the increased production baffles the powers of the imagination. In 1850 the exports of cotton cloth reached to one billion of yards; in 1860 the exports reached to two billions; and in 1870 to three billions of yards,—a length more than sufficient to pass sixty times round the globe. This wonderful achievement has been accomplished by improvements in machinery, and by greatly increasing its speed. The machine-tools employed in metal-working are wonderfully ingenious and successful in their operation, but they are not more so than those that have been elaborated in recent years for wood-working, as was made manifest to the numerous gentlemen who last week accepted an invitation from Messrs. Allen Ransome & Co., of Chelsea, to inspect a selection of their wood-working machines in operation.

It may be supposed that the erection of a show-room for machines at work is an outcome of the experience of this firm, and capable of serving several important purposes. It must obviously be inconvenient, on several grounds, to try new machines in the workshops in which they are put together, and this may have suggested the provision of additional premises and separate power for trying machines under fairly favourable circumstances. The show-room further affords means for trying selections from the machines, about 250 in number, now produced by the firm. Trial of the machines upon even the most limited scale, however, involves, from the rapidity of their action, a large expenditure of timber, and this circumstance may have led the proprietors to become producers of mouldings, and other work to the trade. Yet, again, the show-room affords means for training the work-people of intending purchasers to the use of the machines.

The operations embraced by the machines put to work were varied in character, including sawing, planing, mortising and tenoning, moulding-running, mitreing, saw-sharpening, &c.

The merit and value of the sawing machinery, and of all the machines, indeed, will be best appreciated by contrast with the tools used and the work done by hand-labour, before the introduction of machinery, and in use still, in many country places and small concerns. With trees and squared logs, for pit-sawing, the upper side is dressed with an adze, and the stuff into which it has to be cut marked off with a wet red line; the lines for the under-side have to be marked off by plummet, the log is canted over, and the lines struck with chalk. Then commences the wearing muscular exertion, harder than almost any other description of manual labour; the poor pitman is often nearly blinded by the fine particles of the sawdust, and does not always see or keep to his line. The portion of the log on the headstock is left to be split, when the drafts are run home, and 2 in. or 3 in. at the end of the boards are often thus wasted. The result of the slavish toil of the two men is to cut about 400 ft. super. of fir, or 250 ft. of hard wood per day; the one paid at the rate of 3s., the other 4s. 6d. per 100 ft. Turning now to the sawing-frames shown at work by Messrs. Ransome & Co., we get at a remarkable contrast.

The principal sawing-machines for heavy work shown were a portable combined timber and deal frame, and a patent portable deal and batten frame. The first-named will take 18 saws, and is equal to timber of about 18 in. on the side; the deal frame takes 16 saws, in two groups of 8 each, which balance each other, and make their strokes alternately at the rate of 450 strokes per minute. The points of difference between the performances of this strong and clever machine and pit-work are, that with the one no lines need be struck, there are no split ends, no unequal surfaces with heights to be brought down to the hollows by the plane; the work is greatly superior in evenness and smoothness of surface, in perfect equality of thickness, and the work may be against 400 ft. super. as in pit-work from 8,000 ft. to 10,000 ft. per day, or above twenty times the quantity. The timber frame is not worked at such a high velocity, but it also performs excellent work. It is necessary, of course, as in pit-work, to cut out broken dog-heads from the logs, but no top dressing is considered necessary, or lines on either top or bottom, accuracy of work being secured by the fixing of the saws, and of the log upon the travelling bearers. The defects attending hand-sawing, whether by the ripping-saw for straight work, or the framed break-saw, the bow saw, or the key-hole saw, for curved work, are no less serious than those attaching to pit-work. There is the constant liability to waste material, and cause extra after-work, by departure from the perpendicular. This serious defect is completely obviated, and more than twenty times the quantity of greatly superior work is performed by the circular saw attached to the general joiner, and especially by the band-saw machine, which is equal to the most delicate fret-work, with an endless saw of less than $\frac{1}{8}$ in. broad up to breaking out stuff 18 in. thick. This machine is very strong, and remarkably free from vibration when at work. The cross-cut, ripping-out, grooving, and rebating processes are conducted on separate benches, and, in some instances, as parts of the "general joiner."

After the sawing processes, of primary and secondary character, come, of course, the dressing-machines. The most remarkable novelty in this department, shown by Messrs. Ransome & Co., was a patent combined planing and moulding machine. The special feature in this is the introduction of two sets of extra cutters, one above, one below, and one on each side, which act, so to speak, as jack planes, removing with a free cutting all grit and sand from the sides and edges of the boards. The surfaces thus prepared are finished by keen-edged cutters, working at a very high velocity. The machine is intended for working heavy mouldings, which are roughed out by the extra cutters; or to plane, groove, tongue, edge, and thickness, at one operation, boards up to 12 in. wide, at rates varying from 20 ft. to 40 ft. per minute. The work we saw the machine perform was to dress, on both sides and edges and thickness, 11-in. boards, of $1\frac{1}{4}$ in. thick. The work came from the machine with a silky gloss that, it might have been supposed, could only have been given by a panel-plane in good order. The edges were smooth and straight, and the equality in width and thickness perfectly uniform throughout. The framing of the machine, which is very strong, has all the working parts attached to it. The speed of the counter-shaft is 1,000 revolutions per minute. One of the most interesting machines shown at work was throwing off ogee-and-bead door mouldings, $1\frac{1}{4}$ in. by $\frac{3}{4}$ in., at the rate of 40 ft. per minute, or above four miles for the day of ten hours. The performances of this clever little machine are in strong contrast with the most that could be done by the best workman, with tools in perfect order. If he could accomplish even a fortieth part of the work done by the machine, not taking account of the ripping out, he would have to gauge and dress to breadth and thickness, to chamfer, and run his moulding upon six 10-ft. lengths in the hour, which would be excellent work, even if the application of two or three grades of glass-paper should be unnecessary. This machine has the advantage of producing an extraordinary quantity of excellent work with a small expenditure of power; it is also low in first cost, and may be worked by an unskilled labourer. We have seen a youth doing his first day's work upon it, which he got through without difficulty or hindrance. By a very simple contrivance the lengths of moulding are thrown off at the back, and stacked as they pass through the machine. The excellent finish of the work is attributable to two main causes, the condition of the cutters, and the high speed at which they revolve; the same remark applies to almost all the machines shown. In the case of this moulding-machine, the cutter-blocks were making 7,000 revolutions per minute, and throwing off in that time 84,000 shavings. Strictly speaking, the surface of this machine work is a series of ridges, but the velocity of the revolutions throws the ridges so close together as to give a practically smooth surface, the cuts running about thirty to the inch.

The "General Joiner" was probably the "Admirable Crichton" of the exhibition. Its powers were displayed in ripping, cross-cutting, planing, cutting mouldings, straight and circular, grooving, mortising, tenoning, boring, rebating, and chamfering. We do not know how many of these operations can be carried on simultaneously; but two of them, at least, ripping and tenoning, were carried on at the same time, and, so to say, independently of each other, the power for the two actions being taken from different spindles. The mortise and tenon work done by the general joiner is of a quality rarely attained by hand; the surfaces are so perfectly even, and the width and thickness so equal, that the joinings would be as compact as whole wood. The mortising process is accomplished by borings at each end; these being pierced, the same tool traverses between them, cutting out cleanly and rapidly the wood left. The ends of the mortises are cut square by hand. The quality of the work produced by this machine is very excellent; the quantity, as compared to hand labour, which it is capable to perform, is greater than we dare venture to surmise.

In addition to the wood-working machines shown, a saw-sharpener was exhibited at work upon a circular saw. It sharpens and gullets the teeth by means of revolving discs of emery, working in a counter-balanced swinging carriage. A few revolutions of the emery disc deepened the gullet sufficiently, or dressed the top of the tooth. It must be evident to any one who sees this ingeniously-constructed and effective machine in operation, that its use must effect an important saving in time and labour, and in outlay for files.

Yet one other machine, worked by hand, that was shown, is well worthy of notice, in Shute's

patent mitreing machine. It is quite a novelty, and is strong, simple in action, and effective. The sole of the machine is of planed iron, and the two sides are open cast-iron triangular plates, bound to each other at the top, and bolted to the sole at the bottom. The front of the machine, which is on the mitre angle of 45, has accurately-adjusted grooves, in which a strong cutter, with a central angular point, works. The cutter is operated by a hinged lever attached to the top of the machine, and having a jointed arm between it and the cutter. There are no fixings necessary; the moulding, from 4½ in. downwards, is held firmly to the sole and the back-rest by one band, and with the other the lever is brought down, and a clean-cut mitre is made by a single slice, a much more summary process than cutting in the mitre-box and dressing with the plane upon the mitre-Block. It is claimed for it that it will mitre Bolection or return mouldings without splintering them. That will depend very much upon the depth of the return; but whether the machine is capable of doing this or not, it commands such unquestionable capabilities for ordinary mitre-work as cannot fail to bring it into favour.

THE "NORTH WESTERN" HOTEL, LIVERPOOL.

SOME little time since we noticed briefly the architectural design of the large hotel built by the London and North-Western Railway Company as an adjunct to their Liverpool Terminus. The building, which, as our readers may remember, is planned and designed by Mr. Waterhouse, is this week completed internally and ready for occupation, so that visitors to Liverpool will be able to judge for themselves of the practical as well as the architectural merits of this large establishment. The principal rooms, which are furnished in a costly manner and with every attention to the comfort and convenience of inmates, have been decorated in colour by Messrs. White & Son, of Liverpool, from the designs and under the direction of Mr. Allen, of London. The front suite of rooms on the ground floor comprises coffee-room, reading-room, drawing-room and dining-room, billiard and smoking rooms. In all but the two last-named apartments, the large iron columns necessary to carry some of the partition walls of the chamber story above, have been made a feature both in the architectural and decorative design. The columns, which are fluted for one-third their height, and plain above, are treated mostly with gilding on a dark chocolate ground, the fluting has gilding on the fillets, the upper plain portion of the shaft decorated with a continuous design of stem and leafage in gold, as if wreathed up the column. The character of this design has been skilfully and suitably varied in accordance with the uses and associations of the different apartments, and the general effect of it is pretty, but not sufficiently rigid and architectural in character for its position; and unfortunately the strong contrast of the chocolate and gold forms too violent an opposition to the much quieter colouring of the ceilings. In the coffee-room this is so much the case, as to give the impression that the ceiling is unfinished: it would certainly require much stronger tints, and more elaborate decorative detail, to bring it into harmony with its supports. Beneath the cornice of each room runs a kind of frieze of conventional ornament, interspersed with medallions, containing allegorical heads or figure subjects; those in the coffee-room having reference to commerce and enterprise, the dining-room frieze being decorated with representations of sundry delicacies of the shooting season (making "game," in fact, of the whole thing), while in the drawing-room, the eyes of lady visitors may be suitably entertained by representations of "Faith," "Hope," "Charity," "Love," and we know not what other graces and virtues—are not their names inscribed beneath each? The frieze of the billiard-room gives us, humorously enough told, the old fable of the two men with their ass, who tried to please all parties; and the smoking-room holds forth certain allegorical warnings against, or encouragements to, vice; they may be read either way. The soffit of the large arch carrying the principal staircase, shows the signs of the zodiac (a never-failing resource, it should seem, of decorative artists) and the staircase is to be adorned eventually with larger figure subjects life size, of which one panel is partially executed as a specimen, and may be accepted as sufficiently good for a position where it is not likely to receive very critical inspection. The staircase is lighted from above with some very poor stained glass supplied by a Liverpool firm, in which the principal ingredients in the way of colour are "mauve" and strong yellow. The general impression left by the decoration is that more has been attempted than was necessary in certain portions, and less than might be desirable in other places, and that there is a want of architectural feeling about it. The execution is very good throughout.

A considerable part of the first floor of the hotel is laid out in suites of rooms, two, three, or more, for families;—the rest of the floors apportioned into bedrooms and separate sitting-rooms, as usual. The lower mezzanine contains a complete set of sleeping-rooms for visitors' servants; the house servants being accommodated at the top of the building. The kitchen accommodation is ample and well arranged for easy working, with dinner-lift into the serving-room adjoining the coffee-room over. There is an ascending room for visitors, worked by a hydraulic lift supplied with water by a donkey-engine, and a luggage-lift worked by steam alone. A separate boiler is provided, apart from the usual kitchen boiler, to furnish the hot-water supply for the whole house. The basement contains, besides the kitchen and other offices, ample cellarage accommodation, and is very well lighted. The greater portion of the ground-floor on the railway-station side is occupied by first and second-class refreshment-rooms, in immediate connexion with the hotel. The centre hall and staircase are to be heated by hot air discharged through a grating under the first flight of stairs; but this has been the source of some little trouble, as the current of heated air has brought with it already no small amount of dust and dirt, which has in some degree disfigured the work at this part, and the mechanical adjustment of the outlet is under re-consideration. The general fittings and furnishing have been carried out on a most liberal scale; the sum of 20,000*l.* has been named as the entire cost of this part of the work, which seems more likely to be under than over the truth. It should be added that whatever difference of opinion may exist as to the architectural aspect of the hotel externally (and Liverpool people at least do not seem satisfied with it on this score), there can be no question that the general plan and arrangement exhibit in a high degree that talent for simple and convenient planning and concentration for which its architect has gained so high a reputation with all who can appreciate the difficulty and importance of this portion of an architect's duties, in connexion with any large building where what may be termed internal traffic on a large scale is to be provided for.

SMITHFIELD DRINKING FOUNTAIN COMPETITION.

AT the end of last year the Markets Improvement Committee of the Corporation of the City of London invited designs and estimates for the erection of a drinking-fountain in the centre of the circular space in Smithfield, between the Metropolitan Meat and Poultry Market and St. Bartholomew's Hospital. Each competitor was required to submit "at least a plan, elevation, and section, drawn to a scale of ½ in. to 1 ft.," and to state the sum of money for which he would undertake to erect completely the fountain as shown by his design; such sum was to include all expenses whatsoever, water service, drainage, and drinking-cups, and the total expense was not under any circumstances to exceed the sum of 1,200*l.* The committee did not bind themselves to accept any one of the designs submitted to them, nor did they offer any premiums.

In reply, some forty designs have been sent in, and are now hung on screens in the crypt of the Guildhall, for want of room elsewhere, where they can be well seen by gaslight. With very few exceptions, the names of the designers are attached, very properly; indeed, where sculpture is concerned, the selection of a design without knowing who was to carry it into execution would be futile. The first hung design marked only with initials, A. Z., sets forth a lofty Gothic column in the centre of a large basin; the top of the column consisting of canopied niches for figures of martyrs surmounted by an equestrian statue of Walworth,—a monument rather than a fountain. Mr. Butler sends a temple-like structure owing something to those put up for Miss Coutts; but not without merit though poorly set forth in the perspective drawing. Messrs. Boehm (sculptor) and Jeckyll (architect) propose a bull on a basement, with his driver, the bull very well modelled, as might be expected from Mr. Boehm. Messrs. Cox & Son exhibit a very agreeable arrangement of marble and granite basins and columns in two stories, though the chimney-pot aspect of the topmost jet might be improved. Messrs. Farmer & Brindley show a Gothic base carrying a column, with a figure on the top; the figure, like the majority here, very badly drawn. Mr. E. A. Heffer is less successful on this than on some similar occasions. His design takes the shape of the upper part of a Perpendicular-Gothic tower, partly sunk in the ground. Mr. Kelsey suggests a statue of St. George on a pedestal, the details of which are unsatisfactory. His hirsute figure of St. George, too, though drawn with spirit, is a mistake. Mr. Rolfe gives two stories of arcades, not inelegant, but over-slight in construction. Messrs. Sim & Smith send a design for a structure of some elegance on four arches, with figures of Victory surmounting the angles. The *projet* forwarded by Mr. E. W. Wyon, sculptor, and Mr. E. A. Wyon, architect, includes a figure of London, in Sicilian marble, a model of which accompanies the drawing. Mr. W. Young's design (Gothic basins, figure at top) is good of its kind. The Gothic column carrying a figure under a canopy, marked "Aquarius," deserves attention. Mr. A. T. Jackson proposes a somewhat expensive Gothic building, inclosing a space within which would stand the fountain, a somewhat risky resort, especially at night. Perhaps the most original suggestion is that marked—"But here's my comfort," wherein eight Mediæval columns, dispersed octagonally, carry an entablature, from which rises a belfry-like structure, with tiled roofs, and central spire leaded. Mr. H. H. Vale sends a design for a Gothic spire, with sculptured figures around the basement, which alone would cost nearly all the money available.

If we were called on to name half a dozen of the designs most likely to include the one to be selected, we should probably name those sent by A. Z., Mr. Butler, Messrs. Boehm & Jeckyll, Messrs. Cox & Son, Messrs. Sim & Smith, and Messrs. Wyon.

The site for the fountain is in the centre of the area formed by the circular road down to the Great Western Railway Depôt, a plot 140 ft. in diameter, so that the fountain will need to have some mass and height, if it is to produce any effect. The space around it will probably be planted.

THE SUPPLY OF WATER TO EDINBURGH.

THE capital of Scotland is at this moment plunged into a serious controversy on the question of its increased water supply,—a controversy which has at length culminated (as we regret to observe) in a Parliamentary contest. Briefly stated, the case is something like this. The water trustees, who are chiefly composed of members of the town council of Edinburgh, and who act, it must always be presumed, in the interests of the community, are promoting a gigantic scheme for supplying the district with the water of St. Mary's Loch in Selkirkshire. To this scheme there has sprung up a highly-influential opposition on the part of the rate-payers, composed of such men as Mr. Adam Black and Mr. Charles Cowan (both formerly members for the city), together with a whole phalanx of other eminent citizens, who hold the opinion, and have resolved at a public meeting, that the St. Mary's Loch scheme is not only too costly, but is wholly unnecessary; and, moreover, that the quality of the water is bad. Both sides, it is proper to explain, admit the scarcity of water, and both insist on the urgent necessity of an increased supply. But while the promoters insist upon St. Mary's Loch, the objectors assert that Edinburgh can be supplied more economically from the springs and rainfall of the neighbouring hills.

The present water-supply of Edinburgh is derived, as we have often mentioned, from the springs and rivulets of the Pentland Hills,—a ridge of granitic rocks lying to the south of the city. Until a period within the last two years or so this water-supply was controlled by a private company of adventurers, under the title of the Edinburgh Water Company, the manager of which was Mr. Alexander Ramsay, while the engineer was Mr. Charles Leslie; and it must be admitted on all hands that both the managemen

and the civil engineering were of the very highest of their respective qualities. Indeed, there is probably no engineer in England, at this moment, who has had more experience in constructing water-works of a certain description than Mr. Leslie; and we can all remember his excellent evidence on the cause of the failure of the Sheffield embankment. At the same time, a feeling had recently grown up in the public mind, that the supply of water to our great cities is, properly speaking, not the functions of joint-stock companies, but of the municipal government. The corporation of Edinburgh, following closely in the wake of Liverpool, Glasgow, and other important places, accordingly acquired, under an Act of Parliament, in the year 1869, the whole works of the Edinburgh Water Company, and the whole title, statutory powers, and legal authority,—vested, as we have said, in certain trustees,—to supply the city of Edinburgh, the port of Leith, and the town of Portobello.

The nature of these works so taken over will be understood, perhaps, from a glance at the following statement, which professes to give a comparative account of the quantities of water contained at this moment in the different reservoirs on the Pentland Hills. The drainage area, we may mention, including the reservoirs, occupies a space of about 15,000 imperial acres; and their average altitude is something like 400 ft. above the level of the sea. Edinburgh, it may be remembered, has a sort of average altitude—speaking roughly—of 200 ft. Leith and Portobello both lie close to the beach. And the population of the whole district included in the Bill may amount at this moment to something like 200,000.

The present water supply of Edinburgh, according to Mr. Wormald's figures, is seven millions of gallons a day, on an average taken over the whole year. Sometimes there are nine million gallons, sometimes less. Even during the two last very dry seasons the average had been more than seven millions; but taken at that estimate there follows a quantity of about thirty-two gallons per head per day, being more by comparison than sixteen of the largest cities and towns in England and Scotland at this moment possessed. Of course, it is not disputed that the major quantity of this, in some respects, ample provision consists of storage; and it has been alleged on the part of the objectors, that it would be very easy and comparatively cheap to increase this storage, so that another ten gallons per head might be added to the present supply. But the following paragraph will convey more information to our professional readers, regarding the capacity of the reservoirs on the Pentlands:—

"The rain and snow which have recently fallen have brought considerable accessions to the quantity of water in store. In Glencorse reservoir, where, on the 25th ult., the water stood at 16 ft. from the top, the level is now 8 ft. higher, the stock having increased from 25 million to 38 million cubic feet, as compared with a total capacity of 55 millions. Loganlee, which was quite empty three weeks ago, now contains rather more than one million cubic feet, being about one-eighteenth of its capacity. Clubbiedean, which was 6 ft. down, or two-thirds full, on the 25th ult., is now running over, its capacity being 9,800,000 cubic feet. Torduff was stated in our last report to be 28 ft. down, or one-third full. It is now only 17 ft. down, or more than half full, the stock being 9,900,000 cubic feet, as against a capacity of about 18 millions. Bonally, 17 ft. down on the 25th ult., has gained 1½ ft., its stock having increased from 560,000 to 900,000 cubic feet, which is still less than one-seventh of the quantity it is capable of holding. At the corresponding date last year there were in Glencorse 42 million cubic feet, as against 38 millions at present. Loganlee, now containing one million cubic feet, had then four millions. Clubbiedean was lower at this time last year, having only 3,500,000, as compared with the present quantity of 9,800,000 cubic feet. Torduff now shows 9,900,000 cubic feet, as against 6,500,000 at this time last year; and Bonally had last year only 126,000 cubic feet, as compared with 900,000 at the present date. Putting the above quantities together, it appears that the present stock reaches a total of 59,600,000 cubic feet, as against 56,126,000 cubic feet at the corresponding date last year—increase this year, 3,474,000 cubic feet. It is perhaps worthy of note that the increase is due to the north side reservoirs. In Glencorse and Loganlee together, there were at this time last year 46,000,000 cubic feet; now, 39,000,000 cubic feet—difference in favour of last year, 7,000,000. In Clubbiedean, Torduff, and Bonally together, there were at this time last year 10,126,000 cubic feet; now 20,600,000 cubic feet—difference in favour of the present year, 10,474,000 cubic feet.*

The sum and substance of all this is that the present reservoirs on the Pentland Hills contain a storage of 60 millions of cubic feet within a small fraction. It need hardly be added, that were it possible to preserve this immense storage of water at its present maximum, there would be no lack of pure water in the Edinburgh cisterns. But, unfortunately, the dry east winds of spring, and the hot sun of July, are not so productive of moisture or of rainfall as the winter months are in that latitude; and, accordingly, towards the end of August, it commonly happens that those Clubbiedean, Loganlee, Torduff, and Bonally reservoirs (the whole reservoirs, in fact, except Glencorse) are emptied to their very bottoms; and a city, or rather, as we have said, a district, of 200,000 inhabitants is thereby reduced to the direst extremities from want of the first necessary of human life.

In order to show this more explicitly, we may compare the summer with the winter statistics. The trustees, who, after acquiring the property, began visiting and exploring the works, were informed upon one occasion (we think last year) that the summer flow of the springs,—they do not seem to have estimated the rainfall which went to constitute the above supply,—was as follows:—

	Feet per Minute.
Crawley Springs (south side)	70
Barclair and Liston Shiels (north side)	160
Colzium	150
Crosswood	80
Comiston and Liranston	15
Total	475

Making together a total supply of 475 cubic feet per minute. But from this quantity there falls to be deducted a quantity of 102½ gallons, which is given by way of compensation to certain paper-makers and bleachers at Bonally; after which there falls to be added the quantity drawn from Glencorse (the largest) reservoir, equal to 180 gallons, which gives a final result of 553½ cubic feet per minute, or, in round numbers, 5,000,000 gallons per day. This is equal to 23 gallons per head per day to the population, or, deducting 14 per cent. as the estimated quantity supplied to manufacturers, a quantity of 20 gallons per head per day for domestic consumption. And even this quantity, which is of course inadequate, was diminished by a waste which, according to Mr. Ramsay's former estimate, approximates to 33⅓ per cent., or nearly one-third of the whole supply.*

Some questions arose and some observations were made by the visiting trustees on the possibility of getting a further supply and increased storage from the southern slopes of the hills, which, it should seem, are still unappropriated; but the conclusion was arrived at by them that such a supply could only suffice to meet the growing requirements of the district for a very limited time; and, in fine, the visiting committee recommended the water trustees to look elsewhere than to the Pentland Hills for an adequate additional supply of water to Edinburgh.

The trustees, however, had long before this made up their minds to go to St. Mary's Loch; and "thereby hangs a tale," as Jaques says, but we cannot now stop to *pull* it.

HOMES FOR WORKING BOYS.

ON Monday evening last, Mr. and Mrs. George Hanbury gathered to their House, in Portman-square, a large number of influential persons, with the view of making known what had resulted from efforts recently made to provide homes for working boys in London, in order to save them from the temptations incident to their residence in the common lodging-houses of the metropolis. Mr. Hanbury, and Mr. A. O. Charles, the hon. secretary, explained the movement; and, from their addresses, it appeared that it was begun in the early part of last year, and is virtually supplementary to the reformatory and refuge work which is being promoted so largely elsewhere; and it was but natural to be told that some of the boys who have come under the operation of the society during the few months of its working were once inmates of the Home for Little Boys, the Boys' Refuge in Whitechapel, the Boys' Home in Regent's Park-road, and the Green Queen-street Refuge. Two homes at present exist, one in Spital-square, Bishopsgate-street, the other in Lower Seymour-street, Portman-square. They accommodate about seventy boys, the fundamental principle of whose admittance is that they pay for themselves as far as they can. Although they may come therefore from reformatories and even workhouses, they there begin a point of existence where they no longer depend absolutely upon charity. This is especially enforced upon them; but as the cost per boy per week, including food, is 4s. 6d., it is apparent that with boys earning less than that sum the Institution cannot be wholly self-supporting. The wages earned by the boys in the two existing homes range from 4s. to 12s. per week; and owing to the low rate of wages, and a plethora of boy labour, the institutions have suffered a loss of nearly 2s. per week upon each inmate. The boys have, to begin with, a home, superintended by master and matron, with all the comforts of a home provided for them; but, lest mischief should be found for idle hands to do, the directors add to the more material appliances, reading-rooms, gymnasiums, and other provisions of a recreative and educational character, and take care to build the whole structure upon a religious basis.

A number of gentlemen, including Dr. Lankester, Mr. R. Rawlinson, Sir Fowell Buxton, Mr. Tufnell, Sir J. Hamilton, the Rev. Dr. Rigg, Mr. Godwin, and others, being called on by their host, addressed the meeting, and some valuable suggestions were made.

It is to be hoped that Mr. Hanbury and his colleagues will be supported in their endeavours, and that the example will be followed in other parts of London.

FRESCO PAINTING.

IN the fourth Cantor Lecture, "On Colours and Pigments," Mr. Barff said,—Experiments in fresco-painting have been made in this country, and from the result of these experiments I am very much afraid that many of us have formed wrong expressions about fresco-painting. We have seen that, in really advantageous situations fresco-paintings have become disintegrated, the colours have gone, and the surfaces have come off either in flakes or in powder. If you visit the city of Munich, and go to the church of St. Bonifacio, you will see that it has been decorated by Professor Hesse with fresco-paintings, which were executed thirty years ago, or more than that. The paintings there are standing well, and have stood well, except where moisture has come in from behind, and has thrown off the painted surface from the front. Now, no painting, whether it be executed in silicious colours or in fresco colours, can stand the action of damp affecting it from behind; that is simply impossible. But I may speak with confidence about fresco-painting, because some twenty years ago a large public building was decorated in fresco-painting, and pictures in it were painted in fresco by Munich artists, and also some by English artists, who had learned the method from the Munich artists. That building I have not seen myself for many years now, but I have been told by many gentlemen that it is still in a state of perfect preservation, and the fresco has not in any way disintegrated either in the ornamental part or in the picture subjects. I can, therefore, speak with confidence of fresco-painting when executed in the way in which it is performed by those gentlemen who have made it their study, since the revival of art in Munich.

I will, to the best of my ability, describe to you the method in which I was taught fresco-painting in Munich, and speak of those influences which are likely to interfere with the permanence of pictures painted in it. But, first of all, I must take you aside, for a few moments, to another subject, although one intimately connected with fresco-painting. When lime is mixed with sand, and used for building purposes, it is called mortar; but how is it that mortar, which is soft when first laid, becomes hard in the course of time? You have lime, some of which has absorbed carbonic acid from the air, and has become carbonate of lime, which is equivalent to chalk; it is, in fact, chalk. You have also sand, for without the sand the lime will not harden, it will break and crumble away; but with the sand it makes a hard compost. The lime, in the presence of water, acts upon the sand, dissolves and unites with some of the silica of which the sand is composed, and so a silicate of lime is formed, and this silicate of lime forms, I believe, the binding power in mortar.

The ground upon which fresco is painted is a lime ground; and, in order to have a permanent picture, it is clear we must have a firm and stable ground. In order to prepare that ground, first of all the wall must be absolutely dry; there must be no leakage of moisture from behind. Lime which has been run (as it is, I believe, technically called by builders) for a year or a year and a half is best to be employed, for

* These figures, which may be regarded as accurate, are taken from a paragraph headed, "Our Stock of Water," in the *Scotsman* of February 18th, 1871.

* See the Interim Report of the Woods Committee of the "Edinburgh and District Water Trustees," p. 5.

in proportion as the lime has been carbonated (though it must not be so to too great an extent) by the action of the carbonic acid of the air it makes a better and a harder mortar. With this lime must be mixed sand, and a great deal depends on the selection of the sand. It must be river sand, and it should be of even grain; the sand should be mixed with water, and allowed to pass along down a small stream, so that in the centre of the stream you would have sand the grains of which would be pretty nearly equal in size. This is a point of considerable importance. The reason why new lime cannot and ought not to be used is because it blisters; small blisters appear on the surface, and that of course would be ruinous to a picture. A well-plastered wall should not have a blister or a crack in it, and this is secured by having your lime run for some time, of good quality to start with, and mixed with good sand. There is no chemical process that I know of that takes place in fresco-painting other than this, that silicates are formed by the action of the lime upon the sand, and carbonates by the action of the carbonic acid of the air upon the lime.

In painting a fresco picture, inasmuch as there is no re-touching the work when it is finished, the artist must make his drawing very carefully. The cartoon is made upon ordinary paper; then it is fixed against the wall, where the picture is to be painted. The part where the artist decides to begin his work is uncovered; that is to say, a portion of the paper is turned down and cut away, but in such a manner that it may be replaced. Then the plasterer puts fresh plaster, about an eighth of an inch thick, upon the uncovered portion of the wall, and the plasterer's work is of the utmost importance in fresco-painting. The workman ought to practise it well before he attempts to prepare the ground for a large picture, and I have found it of the greatest importance to allow the man to practise for several weeks before he was allowed to prepare any portion of the ground, even for decorative painting. In this way he becomes accustomed to the suction of the wall, and upon the suction of the wall depends the soundness of the ground and the success of fresco-painting. When the plaster is first put on, of course it is very soft; the piece of the cartoon is replaced upon it, and the lines of the picture are gone over with a bone point, so that an indentation is made, and then the artist begins his painting. At first, he finds his colours work greasy; you cannot get the tint to lie on, it works streaky; but you must not mind that, you must paint on, but you must only paint on for a certain time, for if you go on painting too long you will interfere with the satisfactory suction of the ground, which is so necessary to produce a good fresco-painting. Of course, nothing but practice can tell any one the period at which he ought to stop. I cannot describe it, because I should be simply trying to describe a sensation, which I cannot do. After some practice, you know perfectly well by the feel when you ought to stop. If you feel your colour flowing from your brush too readily, you ought to stop at this period. You must then leave your work for a time, and go back to it again. And then you will find, as the plaster sucks in the colour which you have first laid on, that there will be,—it may be in the course of half an hour, it may be an hour; that depends upon the temperature of the atmosphere,—a pleasant suction from your brush, the colour going from it agreeably, and you will find that it will cover better. Now is the time to paint rapidly, and complete the work you have in hand. When the colour leaves your brush as though the wall was thirsty for moisture, you should cease painting; every touch that is applied after that will turn out grey when it dies, and the colour will not be fast upon the wall. You will see, then, how impossible it is, with such materials, to paint in the same style in which you paint a picture in oil-colour. Fresco-painting involves the adoption of an entirely different style from oil-painting. The frescoes of the old masters are not highly-wrought-up, highly-finished works. They depend for their effect upon the juxtaposition of tints, the shadows being intensified by lines and cross-hatching. If you look at those reproductions of some of the most valuable fresco-paintings of the old masters which are brought before us so well by the Arundel Society,—I may particularly mention "The Presentation," in which there are three or four beautiful heads, which are executed life-size;—and if you examine these,—and I believe every line has been copied from the original fresco,—you will see the method adopted by the fresco-painters. They depended upon the juxtaposition of tints, not upon covering over, and over, and over again. That juxtaposition of tints I think we alluded to in an earlier lecture, when speaking of the effect of light upon the retina: then we saw that it produces roundness, transparency, and has a very pleasing effect upon the eye. If two tints are put against one another, they do not appear to us as if they were single, but each adds something to the effect of the other, and together they produce a pleasurable and agreeable effect, if they have been properly selected. I do not know that it is possible for me by word of mouth to give you any better description than I have done, of the method to be employed in the actual laying on of the colours. I know well how tempting it is to go back to a piece of painting, and do something to it that ought to have been done before. We think that a touch will improve it, and we go and make it; but in fresco-painting the temptation must be resisted, for it will be absolutely fatal to the permanency of the work.

It is not for me to find any fault with the works of great artists who have painted in fresco in this country. As to their works, their merits are too great for so humble an individual as I am to speak about; but as regards the mechanical work of some of their fresco painting, I believe that I am at liberty to speak. This work cannot have been done properly, or the paintings would not have become so rapidly disintegrated as some of them have, for most of them are in situations the most excellent for fresco-painting, on inner walls, in dry places, where they are not acted upon by damp from behind, or by accumulated moisture from condensed vapour in front.

As to the colours that can be used in fresco-paintings, I have dwelt very considerably upon the action of potash and alkalies upon colours, and I dare say many asked yourselves why I did so. The reason was, that I had in view this subject of fresco-painting, and that of silicious painting, the consideration of which will occupy us at our next lecture. Colours that will not stand the action of alkalies or lime cannot be used in fresco-painting. The pigments which can be used in fresco-painting are these:—For blues, ultramarine and cobalt; of course you must take the best ultramarine, for there are many ultramarines sold which will not stand the action of lime at all; but the best ultramarine, prepared in France, or that which I was in the habit of using years ago, obtained from Nuremberg, will stand very well. Cobalt blue also stands well, but Prussian blue will not stand at all. For reds, you may have various tints of iron reds, and these tints can now be obtained, of great brilliancy, from oxide of iron. The ordinary oxide of iron, ferric oxide, as chemists term it, can be obtained of a very bright colour, but it is not of the same character, of course, as vermilion, and tints varying from it down to the purple of that substance, which is known as colcothar, may be obtained by different treatments of the oxide of iron. These colours may be got, I believe, in this country; but if all the tints cannot, and if any one requires them, there are those who I am sure will be most willing to meet their wishes, and try to prepare them of sufficient brilliancy and purity. Vermilion, provided it is good—the best vermilion, prepared by such a firm as Messrs. Berger & Co., or the equally good vermilion which is contained in those bottles of Messrs. Winsor & Newton, and also some of the foreign vermilion, will stand on lime, and can be used for fresco-painting. But the pure tint of the vermilion becomes changed, just as it does in oil painting. It gets gradually browner, and I think I threw out a hint why this is so, the other night. Then, again, there is a very beautiful red, called cadmium red, a sample of which I have here in a piece of paper, which any one can see after the lecture, which is also very brilliant. All the cadmiums, from red down to yellow, can be used in fresco-painting, but they must be carefully prepared. If they are not, if there be any sulphur left in them, as there often is, or if there be any of the substance left in them from which they have been precipitated, then I will not say that they would stand; but I know, from practice and from experiments, that cadmium sulphides, well prepared, whether they be dark red or pale yellow, will stand well. Then for greens, you have first, terra-vert. This is an unsatisfactory colour altogether, but it is very useful in fresco painting. I mentioned, if you remember, that first of all, when you begin to paint, your colours work streaky, and you have not proper suction. That is the time, if you are painting green, to prepare your ground with terra-vert: afterwards you may finish with oxides of chromium. I have already alluded to them. There are on the table some oxides of chromium, of various tints, which are absolutely unchangeable. These colours stand the action of lime and of the disintegrating agents that are met with in the air and elsewhere. Then, with regard to yellows,—of course there is cadmium yellow; and, from the experiments which we have performed, I think I may with confidence recommend this aureolin yellow. It has stood the action both of the lime and caustic potash. By-the-bye, I must mention that the action of caustic soda on aureolin yellow seems to be more energetic; in fact, the potash seems to have no action, but the soda does in some way change the tint.

If you are preparing to execute a large fresco work, you will see that, inasmuch as there is no touching up to be done afterwards, all the colours that are necessary for the work must be prepared before you commence; therefore you will have to arrange, in proper gradations, all the tints which you mean to use. Of course, they must be ground and mixed in water, and you may then put them into pots, where they will be ready for use, keeping them moist with a piece of moistened rag or flannel on the top. The method to be adopted for deciding the tint that the colour will have when dried is this: A good-sized piece of umber, unburnt, is taken, and the surface of it is dressed off, and then, when the tints are mixed, they are dashed with the brush upon the umber one after another in succession. The umber takes away the water instantaneously from the colour, and you get the tint nearly as it will appear when dry. Properly painted frescoes will stand well in our climate on inside walls; on outside walls they will not.

A PERUVIAN RAILWAY.

THE new line from the port of Mollendo to Arequipa was inaugurated on the 1st of January, with great festivities, in the presence of the president of Peru and his cabinet, the diplomatic corps resident in Peru, &c.

The railway in question was commenced by Mr. Meiggs, in May, 1868, to be completed within three years, at a cost of 12,000,000 soles. The line, 107 miles in length, leaving Mollendo, runs along the seashore for 12 or 14 miles, until it reaches the point of Mejia, which was originally proposed as the coast terminus. Then, striking into the interior, it passes near the beautiful valley of Tambo, the sugar-producing district for Arequipa, and the other inland towns of this section. Leaving Tambo, they encounter the first great barrier, the mountain of Cahuintala, which seemed to defy the approach of the engineer, who, with theodolite and level, sought to render its hitherto deserted defiles useful to man. The train, clinging to the mountain's side, passes over 14 miles; the engine continually passing inverse curves of 352 ft. radius, the longest piece of straight line being only 1,000 ft. This work alone cost three millions and a half of dollars, and called into action the entire resources of the contractor and his engineers. The grade is, in one section of 3 miles, 4 per cent., and the average along the line 3 per cent. Leaving Cahuintala in the rear, the long pampa of Islay comes in sight. Speeding across it, the little inn of La Ioya, in the midst of the desert, is passed, and the heights of Huasamayo, a lofty basaltic mountain, appear in the distance. Here the same nature of obstacles as in Cahuintala presented itself, but in like manner was overcome. All along this portion of the route are immense fillings, cuttings, and embankments, from 100 ft. to 175 ft. high, and from 100 ft. to 200 ft. in length. Leaving Huasamayo, the valley of Arequipa opens before them—a welcome change from the bleak and dreary expanse of sand desert and volcanic mountains already traversed. In the districts traversed by the line there is a great scarcity of labour, and Mr. Meiggs was obliged to import from Chile and Bolivia nearly 16,000 men to work upon the route. All provisions and necessary articles of consumption, even of the simplest description, were brought from abroad, and at one time a thousand mules were employed daily in conveying water alone to the working parties. Another cause of trouble was found in the thin atmosphere at the more elevated points, Arequipa being, at the terminus of the line, 7,800 ft. above the sea, up which, as will

be seen, the line passes from sea-level; and the suffering endured by those not accustomed to the rarified air is described in some cases as intense. Moreover, Mr. Meiggs was exposed continually to the dangers and probabilities of revolutions. That the road will eventually be a source of profit to the Government there can be little doubt, but until the line connecting the rich interior districts of Puno and Cuzco with Arequipa is concluded, such a result is not to be expected. Propositions are before Congress to employ all of the disposable public funds in the construction of these more than valuable aids to progress.

CHURCH COMPETITION, COLLYHURST.

A NEW church, with parsonage and schools, is to be built at Collyhurst, by Mr. Charles P. Stewart, of the Atlas Works, at a cost of 12,000*l.*, exclusive of the land, which he has also purchased. For these buildings, six architects, of Manchester and London, were invited to submit designs in competition. The gentlemen who were selected to compete were Messrs. Hansom (London), Paley & Austin (Lancaster), Holden, Brakespeare, Lowe, and Dawes, of Manchester. Ultimately the designs submitted by Mr. Lowe were selected, conditionally that they can be carried out for the stipulated cost, and to those submitted by Mr. Dawes was awarded the second premium of 50 guineas.

WASHABLE PAPER.

WE have been looking at some specimens of a new description of washable paperhangings, which seems to possess important economic and sanitary advantages. The surface of the new material is non-absorbent, whilst it has the same dead unpolished appearance as the ordinary paper, and is quite as cheap. Stains of wind, grease, ink, soot, or the ordinary discoloration from wear are readily and entirely removed by simple washing with soap and water, and, should it be necessary, the vigorous application of a stiff brush results in no injury to texture, colour, or pattern. Its capabilities of being cleaned in this manner render it peculiarly suitable for nurseries, bedrooms, hospital and asylum wards, &c., as, after infectious diseases, it would be only necessary to scour the walls like paint, instead of entirely renovating, as is the case with ordinary plastered or papered surfaces. Whilst destructive to insect life, it is in nowise injurious to human beings.

The Anaranth Paper-Staining Company (Limited) has been formed to manufacture this washable paper, and will shortly commence operations on a sufficiently extensive scale.

The patterns, by the way, of the specimens that came before us were very good.

A FIGHT ON STANDING ORDERS, HOUSE OF COMMONS.

THE first skirmishing of Parliamentary business has commenced. The examiners of Standing Orders have opened their peculiar courts, and are in the full swing of their particular work, preliminary to greater contests yet to come.

Great changes have been made during the recess. The conference-room has been prepared, decorated, and newly carpeted, as the dining-room of the honourable members. It adjoins the tea-room, once renowned as the "Cave of Adullam." The entrance to the Lords' lobby has been partitioned off, and enclosed with a screen of carved oak. Behind the screen is the lift, to raise the smoking joints from the culinary regions below. The honourable members will have a full view of the new St. Thomas's Hospital, now complete, on the opposite side of the river. Altogether the new dining-room is much more pleasant than the old one,—more cheery, light and airy, though, in reality, not much larger than their former quarters. But what has this alteration to do with the Examiners' Courts? may well be asked. Not much, truly, except that it will be sure to attract the attention of the engineers, solicitors, Parliamentary agents, surveyors, and witnesses, who must of necessity pass close by. Besides, will not the old *habitués* of the place miss the time-honoured refreshment-stall which formerly occupied the site of the spick and span new lift? Old associations of pleasant memory will instinctively draw attention to the spot; for in the shady recess, and under the small but beautifully groined ceiling of that little lobby, many a knotty point has been discussed and amicably settled. For the future it will be tabooed ground, sacred only to the Soyers and Francatellis of the new culinary dispensation. May happy digestion attend the labours of the honourable members, and the Cave of Adullam, so perilously near, be absent from their thoughts as they chew the cud of sweet and bitter reflection!

It is possible that many of our readers may not know where to find these mysterious Courts of the two Examiners, for though public, they are not much known; it may not, therefore, be amiss to give a clue to their local geography, and for the nonce assume the useful functions of a cicerone. This is the more necessary, because they are more or less ambulatory; they are not of necessity always held in the same place, and, indeed, are liable to be shifted from room to room, as the pressure of other Parliamentary business may require; they are, however, generally holden in one or other of the Commons' Committee-rooms, in the upper corridor fronting the river. To compare great things with small, like the Law Courts, they are approached through the noble expanse of Westminster Hall, certainly the grandest vestibule to any series of Courts in Europe, whether as respects the magnitude of the building, the beauty of the open timbered roof, and, grandest of all, its unrivalled historical associations. So let us proceed through the noble old hall up the broad flight of steps fronting the stained window, rich with heraldic blazonry; turn to the left, into Saint Stephen's Hall, with its array of statues; pass across the lofty octagon, throwing a passing glance at the mosaics in the vault. Leaving the two frescoed lobbies of the Lords and Commons on the right and left, through a short corridor (still waiting for its pictorial decorations), into the square hall, directly in front of us is the new dining-room, and on the right the staircase, leading to the regions above, once so busy, but now so lonely and deserted,—alas! for the palmy days of engineering. At the foot of the staircase is Foley's noble statue of Sir Charles Barry, the architect of the Palace, seated on a marble chair, intensely gazing on a sketching-pad, whereon he has apparently fixed a thought, perhaps an improvement of the House itself, so long talked about, but now so little likely to be effected. The great window close by has been shorn of its coloured glories, and is now filled with a niello work, representing the armorial bearings and insignia of that renowned monarch Edward III., who complacently smiles on the passer by, with his beaver up,—to see the better, or display his long moustaches. Pass up this well-executed staircase,—as good a bit of work as any in the Palace,—a little dark perhaps; then into another frescoed hall, the frescoes, unhappily, crumbling away bit by bit; then the long corridors of the committee-rooms are before us, stretching far away to the right and left, in numbers 16 and 17 of which are the two Examiners' courts,—for courts they must be called,—regular funking rooms for engineers and lawyers, where many a promising scheme of railway enterprise has come to unexpected grief. Here engineers are not unfrequently "hoist by their own petards."

There are two of these preliminary judges, Messrs. Charles Frere and J. H. Robinson, who act for the House of Lords as well as the House of Commons. They seem to enjoy a sort of two-fold title. In the list of officers of the House of Peers they are called "Examiners of Standing Orders," salary, 800*l.* each; but in that of the House of Commons they are termed "Examiners of Petitions for Private Bills," salary, 1,000*l.* Their office is onerous and responsible, for they act in place of a committee of members, although their decisions are by no means final; they report any proved non-compliance with the Standing Orders, and in such cases the peccant plans are technically said to be sent "up-stairs," to a committee of members, who may or may not dispense with the Standing Orders; or, in other words, allow the petitioners to proceed with their Bill, and then run through another and fiercer ordeal "*on merits*," where all the *pros* and *cons.* of the scheme are supposed to be thoroughly investigated, to ascertain if it is worthy of Parliamentary sanction.

In times but recently passed away, what a long array of famous men have played their busy parts in these now deserted halls, when the engineering world was in the full swing of its triumphant career; when Locke, Stephenson, Brunel, and Rendell,—all now dead,—were constant frequenters, as Hawkshaw and Fowler now; when every room in these long corridors was occupied by committees; when they swarmed with eminent counsel, and the lobbies were crowded with excited partisans, anxiously waiting for the all-important decision, fraught with life or death to many a promising Bill and railway scheme. There were giants in those days,—Austin, Talbot, Wrangham, Phinn, and Cockburn,—all gone into the limbo of death, except the last, now Lord Chief Justice of the Queen's Bench.

Amongst the present leaders and men of mark who practise in these Parliamentary Courts, are,—Hope Scott, he of Abbotsford and Arundel, whose tall and portly figure, bland address, and elegant manner of indulging in the luxury of unlimited snuff, are well known; Becket Denison, he of Big Ben and the famous clock; the facetious Merryweather, who enjoys his jokes, as well as the gentle titillation of pungent pinches of rappee, the one as frequent and enlivening as the other; Rodwell; Burke; Davison, the new Advocate-General; Salusbury, and Somerset, with others not unknown to fame in these precincts.

Gentlemen of the long robe, however, do not practise in the Examiners' Courts; their place is taken by the Parliamentary agents, who appear in the capacity of counsel, and although not aspiring to, or adorned with the dignity of wig and gown, possess the faculty of eloquence and much talking in no less a degree than legitimate members of the bar: both delight in showing their skill in the conduct of an argument, no matter how trifling the subject.

Open, sesame! Let us at last enter the august Court. "Hats off!" for are we not standing in the presence of the Senior Examiner, a great and renowned authority, and master of all arts in preliminary Parliamentary matters? and—oh! name it not in Gath!—is he not also the terrible "*Taxing Master*" for the noble house of hereditary legislators, armed with a trenchant pen, to score out sundry and divers long charges in bills of costs? Yea, he is indeed a second Portia come to judgment; he will grant the pound of flesh, but not a drop of blood; that is not written in the bond, Signor Shylock!

There sits the Examiner, a noticeable personage—tall, thin, serenely grave and calm in aspect, like Canning and Lawrence, bald-headed, smugly shaven, well nosed to scent a rat behind the arras of a brief, keen-eyed to peer into plans and allegations, courteous, but firm and decided, with a judicious mixture of properly amalgamated oil and vinegar, to ruffle or smooth the nerves of contending agents or excited engineers; a copious collar of spotless white, duly stiffened and starched, affords a due official gravity in the absence of the more imposing wig and gown of other judges.

His court consists of himself, a smart junior clerk, and a messenger. He sits in solitary majesty at the head of a kind of horse-shoe table; in the middle of the horse-shoe sits the short-hand writer, at a separate table, where he ever and anon plies his cunning craft, and jots down the sage observations and conflicting evidence of the too frequently puzzled witnesses, as well as the invincible arguments of the learned agents when needs be,—but as they are not always worth taking, they are in consequence not always taken.

The bar, if so it may be called, in the absence of barristers, fronts the Examiner, in the shape of a long substantial table, plentifully covered with rolls of mighty plans, bills, briefs, papers of all kinds, and numerous books for reference, with the usual allowance of ink and pens, to say nothing of occasional sandwich boxes for the sustentation of their hungry owners.

Lawyers, engineers, and Parliamentary agents are seated at the table, in all the grandeur of forensic gravity. The agents, the great talking machines, swelling with importance, full of bustle and bottled-up eloquence, of quips and cranks, looking as wise as doves, sharp as foxes, cunning of fence, steeped to the eyes in technicalities and quibbles, of no sort of importance except to themselves, unhappy engineers, and bewildered reference-takers. Behind the bar, scattered about the room, disposed in groups, or lolling on the rail, are witnesses in waiting; assistant engineers, who have had the honour of working up the details of the scheme about to be attacked; surveyors, who have measured the country, and concocted the plans, right or wrong, as the case may be; and reference gentlemen, who make up the lists of owners and occupiers likely to be affected by the proposed railway.

Then come the country part of the fraternity, all more or less engaged in the case, in the shape

of famous town or county surveyors, who are often brought up to London at great expense to prove nothing; clerks of the peace, and humble parish clerks, who prove less than nothing; with a few lookers on, who lounge in, and gaze open-mouthed at the wonderful proceedings, and generally leave the court about as wise as when they entered.

Well, now it has so come to pass that an "eminent engineer"—delightful phrase!— has laboriously prepared the plans, elegantly lithographed, and all that he deems necessary for a line of railway from Muckytown to Dirtyville—all formalities have been in his estimation duly complied with and deposits properly made:—all is congratulation, happiness, and felicity. When, lo and behold, some pestiferous people, rival engineers, get up a furious and unexpected opposition against his immaculate plans, lodge petitions against them, and no end of cunningly-devised allegations, and are prepared to prove that the plans are wrong from beginning to end. Here's a pretty how do you do!

The unlucky engineer and his plans, in spite of the beautiful lithography, are to be pulled to pieces, bit by bit; he has to submit to all the horrors of the Inquisition, with a grave and grim Torquemada to sit in judgment upon himself and his plans, and find him guilty or not guilty of no end of sins of omission and commission. He is told to his teeth that his plans and sections do not agree, that one is longer than the other, that the mileage is erroneous, that his scales are all at sixes and sevens, that he has mistaken roads for rivers, that private roads are public, that he has put fences where ought to be ditches, that fields are woods, and woods are fields, that his gradients are wrong and gravity upset, that his straight lines are crooked and curves nowhere, his levels are wrong; that he will have banks where he should have cuttings, his rails will be under water, and his tunnels too high or too low—his datum is wrong; that his line begins and ends in wrong places; that owners and occupiers are jumbled together in the wildest confusion; in short, he is told that he and his plans ought to be kicked out of the House!

But not so fast, my friends. All these fine charges—this long list of errors and array of indictments—may be disproved; the allegations may be badly drawn; then all this fairy fabric of illusory impeachments falls to the ground dead-born. There is hope yet, confidence revives, a fierce resistance confronts the fiercer opposition, and so the wordy war begins—a right-down fight on Standing Orders!

The Examiner has taken his seat. Silence in court. The case is called; the rivals are in their places; papers are unfolded, plans unrolled: there are the great Parliamentary agents, the orators of the day, mighty men of Gath, tritons amongst the minnows, full of eloquence, ready to burst forth like a thunder-storm when uncorked for action.

There sits the great agent, renowned in a hundred fights, a hard hitter, and, like Romeo Coates, prepared to die the death a dozen times whenever called upon; a little man, but great in soul, a veritable *multum in parvo;* grim, gray, and grizzled, short-haired and long-headed, with a nose which, for the hook thereof, surpasses in glory the renowned proboscis of the immortal Wellington, whom in the pride of his heart he thinks he resembles, not only in the physical aspect of his nasal promontory, but in tact, strategy, skill, courage, and success.

Rooms, lobbies, and corridors, have they not rung with the echoes of his oratory, and the very cobwebs been shaken from the ceilings by the roar of his voice and strength of his arguments, keen enough to cut the court poker in two, and shake the tables into shivers? How beautifully sententious, how elegantly terse, how precise and pragmatical! What dignity in the shake of his finger, and grandeur in the solemnity of his pause and steadfast gaze, when he has carried conviction home,—to himself, at least, if not to the grave Examiner! As confident in his case as he is in himself, how can such a mighty *multum*, so full of ponderous logic, hard facts, and ugly blows, be expected to fail? Perish the thought,—it cannot be.

The rival agent is all alert and ready for the fray,—cool, calm, and collected, confident in the consciousness of his own powers of persuasion, serene as an angel, bland and courteous in manner, soft, suave, oily to unctuousness, feeding on his multifarious papers like a midsummer grub on a vine-leaf, till, full blown, he emerges into active life in all the beauty and splendour of his oratorical wings: he soars aloft in reply, takes a calm flight through the airy regions of his opponent's arguments, disarms them of their sting, pours oil on the troubled waters, and flutters unscathed through all the storms and contentions of the mighty struggle. Gentle of eye, mild of voice, red and rosy of face, he looks at once the father and mother of all the Parliamentary agents who plume their noble pinions, and raise their tuneful voices, in the awful presence of the august Court.

The "formal proofs" are passed, the combatants are ready; the recording angel, in the shape of a shorthand writer, has opened his book of fate,—the conflict has begun. Up jumps the opposing agent, he of the striking profile; with loud and sonorous voice he commences to read a fearful allegation of terrible import, to the effect that there is no cross section to a certain public road marked on the plans. With grave and solemn accents, worthy of the occasion, or even a greater occasion, he points out the heinous nature of the offence, its non-compliance with the Standing Orders. He is prepared to prove the sublime truth of his deftly-worded allegation, by the testimony of a most respectable, important, and independent witness,—no less a personage than the county surveyor, a man of vast experience, skill, and ability, of twenty years' standing in his profession. He calls the witness,—"Where is Septimus Snooks?" No reply. "Where is Septimus Snooks, the county surveyor." Septimus Snooks is found in the lobby, his mouth stuffed with sandwich. Septimus Snooks swallows a glass of sherry, nearly choking himself in the operation; he rushes into the room wiping his mouth *en route*. Septimus Snooks takes his seat in the chair; he endeavours to collect his scattered senses; he has been brought up 250 miles as a most important witness, and this is his evidence:—

"Mr. Septimus Snooks, you are the county surveyor?"—"Hi ham."

"You have been so for many years?"—"Hi 'ave."

"Will you be good enough to find the road on the deposited plan before the Examiner?" Mr. Septimus Snooks gets up, looks at the plan; he cannot find the road, he is in a fog; he is getting nervous; will the engineer point out the road? No, he will not. At last Mr. Septimus Snooks has found a road, to his great delight.

"Now, sir, is that a public road?" asks the opposing agent.—"Yes, it is."

The great agent sits down. He has clearly proved his case, he has no more questions to ask,—when up jumps the bland and courteous agent for the defence, and in his most soft and courtly manner asks Septimus Snooks if he will kindly tell him the mileage of that road on the plan. Of course he will; it is at three miles and a half.

"What, sir? Why that is not the road in the allegation?" Mr. Septimus Snooks is in greater confusion than ever. Which is the road meant? He looks with beseeching eyes to his agent. Can he find the road on his county plan? He searches in vain; he cannot identify the roads. To save time the engineer is permitted to find the road for him; he declares it to be a public road,—that is, to the best of his belief;—indeed, he is sure it is; it must be.

"Pray, Mr. Snooks," asks the bland agent for the defence, "how do you know it is a public road?"—"Because the public go along it!"

"What—oh—ah—indeed! Now, I will prove by my witnesses that it is really a private road, sir,—actually and unmistakably a private road, sir." So he calls his witness, one John Longshanks, a great surveyor and inspector of roads, also brought up 250 miles, to rebut the evidence of the great county surveyor. He takes his seat.

"Mr. Longshanks, you are a surveyor, are you not?"—"Yes"

"Do you know this road?"—"Yes."

"Well, is it public or private?"—"Private."

"Of course! How do you know that it is private?"—"There is a gate across it, with the words, 'No Thoroughfare,' in large letters."

Then, in the blandest manner possible, the agent for the defence asks of the discomfited opposing agent if he has any questions to put to the witness.—No, he has not.

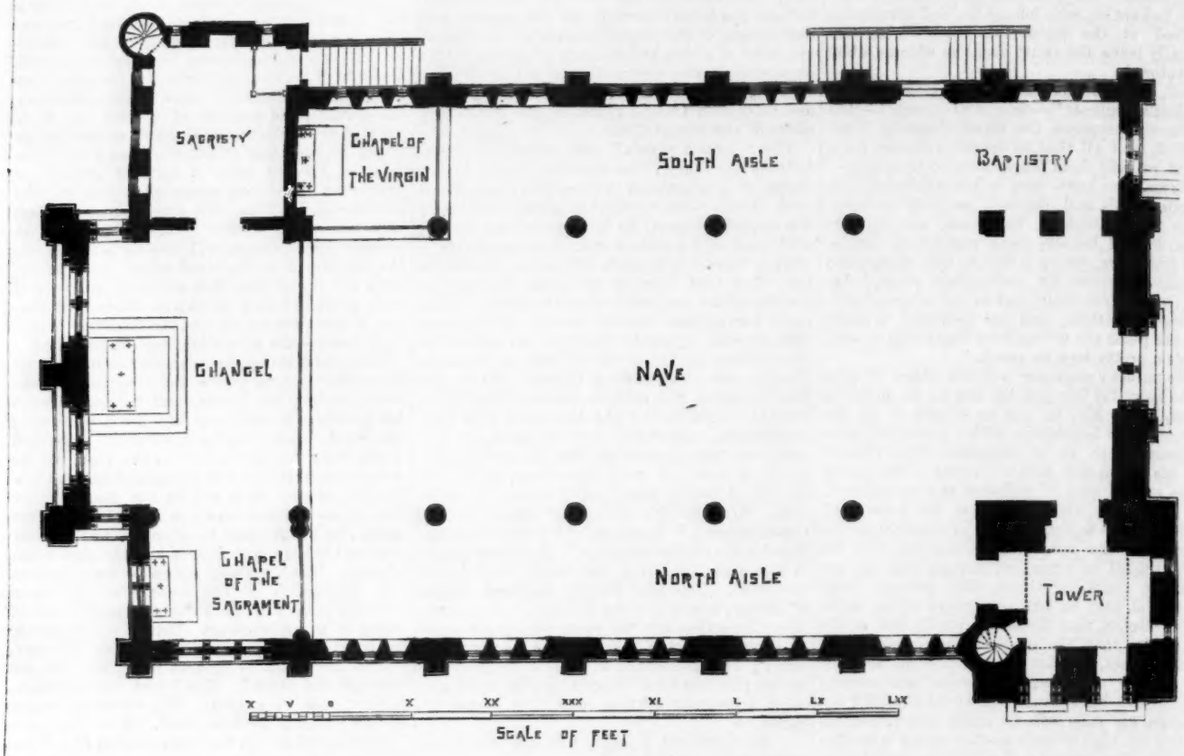
Mr. Longshanks retires, and the courteous agent for the defence sits down, wipes his glasses, folds his arms, and looks with delightful complacency towards the Examiner, and calmly waits for his decision, not without an air of triumph and self-satisfaction.

The Examiner strokes his chin, looks very solemn, and declares the allegation *not sustained:* whereupon the agent for the opposition throws himself into his chair, with a grunt; looks straight down his nose, if that be possible; and fumbles among his voluminous papers. Once again his head is conspicuously reared aloft. Its respected owner has risen to the full standard of his limited height, brief in hand: he reads out an allegation more tremendous than the former; the number of a field has been omitted on the plan, and therefore cannot be found in the book of reference!—a veritable book of fate to many a sucking lawyer; he proclaims aloud the absence of this unlucky number on the plan, and dwells upon the fact with unwearied energy and emphasis. What horrible consequences will flow from this error; the public will be deceived—alas! poor public. How can proprietors find out their property, if such horrible laxity as this is allowed; it cannot, it must not be—it sets the Standing Orders at defiance—the allegation must be sustained.

Softly and slowly rises the courteous agent for the defence, more suave and conciliatory than ever, rubbing his hands, and peering through his glasses. He will explain—of course he will; the whole thing lies in a nutshell. Admitted the missing number is not on the plan, but he will prove that it is safe and sound on the lithographic stone. It is not on the plan, because the paper did not take the ink. It is on the stone; he will produce the stone. The Examiner shakes his head, and it is a terrible head when shaken. The opposing agent protests against the production of the stone; he will have nothing to do with the stone; he might as well bring in a paving-stone. Hush! the Examiner is about to speak: let no dog bark. He says, "The allegation is against the plan, and not against the stone." The bland and courteous agent begs to suggest. His opponent cannot admit; no, not for a moment. Here they both speak together. It has been decided fifty times before. Right, wrong, absurd, nonsense, and similar words come sharply out of the conflict, now waxing hotter and hotter. The Examiner interposes—silence—and declares that he cannot admit the stone; so *exeunt* lithos and lithographer. The battle is not ended yet—far from it. The bland and courteous agent declares that if the number is not to be found on the plan, it is to be found in perfection in the book of reference. "Phew!" exclaims the other; "that is unmitigated moonshine. The allegation is against the plan, and not the book of reference or the stone." He sticks to that: the plan, the plan's the thing. The discussion is brought to an abrupt close. The Examiner declares the allegation to be *sustained*, and thus nips in the bud at least two long-winded orations, ready to burst forth, and astonish the world by the profundity of their imaginary facts and gossamer arguments.

And so the tide of battle rolls along its onward course, surges to and fro, with various ups and downs, now on the right, now on the left flank—then full at the centre, butt into the book of reference. This time it is the lawyers that are touched up and put upon their mettle—for do they not prepare this wonderful book—a fertile source of endless conflict—and, oh! delightful thought, of endless fees and charges? Once more the opposer is on his feet, brief in hand, to bring forward another and still more startling allegation—the book of reference is wrong in the particular instance of John Jones—a most important case—who is declared in the aforesaid book to be not only the owner, but, at the same time, occupier of the property; whereas, the fact is, that one John Jones is the owner, and quite another John Jones is the occupier,—the latter being, as it turns out, cousin to the former, and therefore, physically, altogether a different person, separate and indivisible in his own skin, flesh, and blood. That only one notice has been sent to John Jones, the occupier, and no notice whatever to the far more important personage John Jones the owner, and therefore the Standing Orders cannot have been duly complied with. All these dreadful delictions shall be clearly and distinctly proved by the testimony of unimpeachable witnesses—the identical two John Joneses *in propriâ personâ*.

Hereupon John Jones is called. He is not in the room, and nobody expected he would be. John Jones is bawled in the lobby. There is a rush in the lobby, a crush in the court, when, lo and behold, the two John Joneses confront the astonished owner of the hooked proboscis. The Examiner laughs, and the audience laugh with him. The agent assumes a grave aspect,



ST. PATRICK'S CHURCH, DUNGANNON.

Plan.

stretches forth his hand, and declares, at the top of his voice, that he wants John Jones, the owner: so John Jones, the owner, says, "Here I be, mister," and steps to the seat.

"Are you the owner of the house, No. 185, in the parish of Yspytty Evn?"—"Doan't know."

"Why, man, don't you know your own house?"—"Ess, I do."

"Well, then, is number 158 your property?"—"Never yerd of number 158. My house is number 10, Owen-street."

"Oh, never mind the name and number of your street. Is your house 158 in the book of reference?"—"Never seed the book of reference."

John Jones, the owner, is confused and sorely puzzled,—all he knows is, that he has a house in Yspytty Evn; the more he is questioned the more confused he gets. The two orators wrangle—explain—mystify, make matters worse, and finally give the witness up as incorrigibly stupid. Then, to make all clear and serene, John Jones, the occupier, is called. He knows nothing of the number 158; never heard of No. 158; never saw the book of reference; doesn't know what it means—doesn't want to know; he lives in Yspytty Evn; doesn't know anything else; can't tell what they mean; no, he isn't his cousin; he's another man. So John Jones, the owner, has been brought up from the country 250 miles to prove that he is really himself, and nobody else; and John Jones, the occupier, has been brought up the same 250 miles to prove that he is not the other John Jones.

The bland and courteous agent now rises to explain; he is all wreaths and smiles; he can explain the whole matter in a few words: so, addressing the Examiner (who occasionally yawns), he says the truth is, that when the reference was taken, John Jones, the owner, actually lived in his own house, but that at the beginning of the year he left the house, and let it to the other John Jones, who now lives in it: so that he is sure the reference is quite correct, and the allegation entirely disproved,—that, in fact, both owner and occupier are accurately described; and he ventures to suggest, in the most respectful manner, that the allegation cannot be sustained. He will recall John Jones, if the Examiner will allow him, to prove when he really took the house in question. After a long search, John Jones is found. He has been to look at the pictures in the corridors. He once more takes his seat, and is asked,—

"John Jones, when did you engage the house you live in?"—"At Christmas."

"Did you live in it before Christmas?"—"Noa; I lived at Llansantfraid."

So the courteous agent has proved his case, to his own satisfaction, but not to that of his opponent, who goes off full swing into an argument. He is interrupted. He will not be interrupted,—he has a perfect right to speak,—he will speak,—till he is stopped by the Examiner, who says,—

"Surely you cannot hold the promoters responsible for changes that have taken place since the book was made? I must hold the allegation not sustained."

And so the courteous agent resumes his seat, with an air of intense and unmistakable satisfaction; while the other, foiled by the stupidity of his own witnesses, and the confusion of his allegation, sits down with a chagrined air, and consoles himself by running through his portly brief, nibbling in his sandwich-bag, and sipping a modest glass of sober sherry and water.

Thus the fight ranges from point to point, from case to case, all or nearly all about equal in importance to the elegant specimens just recited for the edification of very patient readers. Wordy contests on such points as these are what are known as Standing Order fights,—occasionally amusing to the lookers-on, but not to those who have to pay,—purely technical, but it seems none the less necessary.

Some of the Parliamentary agents are men of varied ability, professing more or less to maintain legal arguments, and are tolerably well versed in engineering details, so far as is necessary for the thorough understanding of the proper conduct of the purely technical portion of their professional duties. They are mostly men of ready eloquence, and are prone to make a full display of it, when permitted so to do. In this respect, however, they in nowise differ from their learned brethren of the long robe.

The Examiners are not unfrequently called upon to exercise the greatest patience and forbearance while listening to the oft-repeated arguments and somewhat wordy oratory of the conflicting agents; for they have heard the same pretty speeches on the self-same subjects, from the same men, any possible number of times. From the nature of these contests, a really new and original point for discussion rarely turns up: such a new case would, indeed, be quite a godsend, and stir the whole court to its very foundations.

One thing is plain from the peculiar practice of these courts, that plans practically correct in all essentials, if opposed, are often rejected, or fail to comply with Standing Orders; whilst others, radically wrong in every particular, if unopposed, pass muster, and escape with all their manifold sins upon their heads. J. L.

ST. PATRICK'S CHURCH, DUNGANNON.

THIS building, now in course of erection, is the parish church of Dungannon, the chief town of the county Tyrone. It has been undertaken principally through the exertions of the Very Rev. Dean Slane. It is built entirely of the fine warm-coloured yellow sandstone of the district. The roofs are panelled in wood interiorly. The tower and spire will rise to a total height of 195 ft., and will form a conspicuous object in the surrounding landscape. The design is by Mr. J. J. M'Carthy, R.H.A., architect; and Mr. Thomas Byrne, of Belfast, is the contractor.

ST. PATRICK'S CHURCH, DUNGANNON, IRELAND.——MR. J. J. MCCARTHY, ARCHITECT.

THE TECHNICAL EDUCATION OF WORKMEN.

SOME REMARKS ON IT BY A WORKING MAN.

SIR,—The interesting communication of your correspondent, "C," on "How do you prove your Plumb-rule?" interested me, and, like him, I ask, how many men out of the carpenters' branch would be able to give an answer? It appears to me the lawyer, though got up for the occasion, and the jury that accepted his explanation, did not know more about practical work than did the master-builder. As that was no excuse for his ignorance on certain points of his business, it may be well to search for the cause, and see if light cannot be thrown upon it. In what are generally called the good old times, the building trade was divided into separate branches. The master carpenter and joiner performed his part, and nothing more. I believe at that time each employer was a practical man, and perfectly understood the calling he professed. He would have been able to give an answer to any question relating to his branch of the trade. Now all is altered; the steady methods of our forefathers are too slow for this fast age. A master-builder is now master of everything, and some of them are like the jack-of-all-trades—masters of nothing. The age is in all respects a strange one,—it has so many peculiarities: among them nothing is more strange than the rise and fall of employers. In the building trade—and that may be taken as illustrative of many more—there are employers who have never practically followed any part of the trade; clerks, who have never done anything but booked the workmen's time; labourers whose sole knowledge consists in being able to whitewash and patch a ceiling; workmen who, through insufficient abilities and thick-headedness, are not able to get work as journeymen; and not one of them would be able to prove a plumb-rule. There is another class of workmen who rise from the ranks and become employers. A painter that has been a foreman often starts in business. He, no doubt, would to some extent understand the harmony of colours. But he, like his compeers, launches into every part of the trade. He is carpenter, bricklayer, plasterer, mason, and decorator; profoundly versed in the technicalities of each branch; and yet, if put to the test in a law-court, he could not tell "how to prove a plumb-rule." Practically there is but one branch of the trade in which the master and workmen could give an answer to the question; and I think the workmen of that branch would object to the lawyer's method of constructing a straight-edge. The workman's plan is to plane one edge of his board straight, the eye being the regulator. Experience proves the eye is not always to be relied on. The workman, to try it, puts it on a flat surface, draws a line, and then reverses his board: if on so doing the edge touch the line throughout, it is straight, and by gauging to the required breadth, he has both edges straight. A line drawn down the centre, completes and makes a true plumb-rule. It is too true the workmen of England are lacking technical education. Very few of them know the meaning of the term. I think it has for a long time been misapplied: as most of those who knew there was such a thing, supposed it meant something belonging to law—a term which lawyers split hairs upon. Lately it has been brought into general use, and now means the highest knowledge applied to a trade. The urgency of the workmen advancing in the higher forms of science and knowledge connected with their trades, is apparent to many, and more so to those who know anything of commerce, and the conditions on which the prosperity of this country depends. If the workmen of this country are to advance, and keep pace with the workmen of other countries, they must have as good a system of industrial education as the others possess. The rule of thumb may have done good work in the past, but it is certainly out of place in the latter part of the nineteenth century. Unfortunately a loose system pervades every part of society. The upper classes care for little but show and pleasure: killing tame pheasants, and calling it sport, is, if we may believe the daily chroniclers, what gentlemen most delight in. The next class, the upper-middle, as they are called, and the middle proper, are for acquiring riches, and gaining position in society. They ape the manners and customs of those above them. And the workmen largely copy the others, and care for nothing but getting as much as they can for themselves, and giving as little as they can in return. This I attribute to the want of a systematic and technical education. We know our rulers and manufacturers are wonderfully short-sighted as to the wants of the English workmen. Many of them still believe they hold the high pre-eminence which once characterised their workmanship. They live upon our past prestige, and think it can never fail. Their legislation is, in the majority of cases, a failure. Their laws and general governmental transactions, show most clearly the want of a practical and scientific education. The whole machinery of the country is out of gear; oiling and patching do not seem to be of any use; it wants a thorough re-adjusting to suit the exigencies of the age.

Agreeing as I do with the remarks of your correspondents on the educational defects of the workmen, I find fault with them for not suggesting the remedies for their improvement. It is always easy for those who know a little to find fault with others who know less. As there are no effects without a cause, it will be well to investigate the matter, and I think the conclusion we shall arrive at is, the English workmen are ignorant, because employers and others above them are not in a much better condition, and cannot understand what is requisite for the times in which they live. For instance, my trade is in its very bearing a scientific one. Every stroke the carpenter and joiner takes is either a line, a square, or a circle. Their daily labour is with the rule, the square, and compasses; every part of their work is a lesson in geometry. Exactness is the first principle, and yet how few workmen there are who understand angles or circles; and, strange it is, no one, in most cases, ever suggested to them the necessity there was for learning geometry. The workmen are left to grope in the dark, and no employer or foreman can as yet be found to light their way. Not long ago I was working next bench to a man whose rule was constructed so that it could be set to the three common angles,—45, 60, and 90. He handled the rule more than ninety times a day, and yet he had not been observant enough to find out what parts of a circle these angles represented. Although the mitre is in common use, not one workman in twenty knows the angle of 45 is a true mitre. Thinking of the plumb-bob case, I asked three of my mates, of average English intelligence,—in fact, I think they were above the average,—to describe for me an equi-lateral triangle, as I was anxious to know the shape. One had an idea that it was something equal,—he did not understand the "lateral;" another said it was something mathematical; and the other did not know anything about it. I happen to know an *old* apprentice,—what I mean is, he did not begin to learn the trade until he was by age a man. Unfortunately for him, he fancied there was a royal road to learning, and he had only to say he would be a carpenter, and the work was done. Although I believe it is never too late to learn, and that the true and earnest workman will be a student all his life; nevertheless it requires earnestness, assiduity, observation, and opportunity. Armed with these, the workman can defy ignorance, and help to build up the usefulness of the working classes. The man apprentice has been at the trade for nearly four years, yet it appears he keeps his eyes no further open than the boys who begin at fourteen; and as no one had impressed on him the necessity for doing so, his own common sense had not taught him. Thinking of the plumb-rule case, I requested him to strike a bob-hole. He did not know how to do it, and he did not know there was a rule to do it by.

I believe I have before, in the columns of the *Builder*, alluded to the want of systematic instruction of the workmen. Take the case of an apprentice, and follow him to the close of his term. He is, in most cases, taken at random, without any one knowing what are his tendencies and abilities. The caprice of parents or some other accident places him in the position he is through life to live by. No advice or instruction is given him as to the qualities necessary to be successful, and become an honour to the craftsmen among whom his lot is cast. If he make a good workmen, it is an accident; if he is the opposite, it is not always his fault. "Sufficient for the day is the evil thereof" is the workman's motto. Too many lay by no store of knowledge to meet emergencies which may arise. How much the usefulness and intelligence of the rising generation of workmen depend upon the guidance of others, to show them that earnestness and perseverance are the natural adjuncts and allies to success,—without them, life is likely to be a blank. The English schoolmaster is not yet abroad; and where he is, indications are already apparent that he will not understand that the industrial harvest of ignorance is indeed ripe, but the mowers of it down are few. A movement is already on foot for establishing schools and universities, after the manner of those of France and other parts of the Continent. They are greatly needed; and, if established, would do immense good, and give an impetus to the intelligence of the workshop. My object is not to deal so much with special cases. I want technical workshops. A workshop, in my opinion, ought to be a technical school of the highest order. The primary and elementary ought to lay the groundwork, and the workshop should complete the structure. How is it to be done, and who is to do it? is the next important question. In the first place, every town and village ought and must have a free library and lecture-room, supplied with books for general use. Reading ought, from childhood, to form one of the duties and enjoyments of life. I believe the reader rarely, if ever, runs into the excesses and vices which disgrace humanity. It is, further, the best and cheapest of all pleasures. Special manuals, relating to the science of trade of every description carried on, ought to be within the reach of apprentices and workmen. The employer or the foreman ought to organise classes, and lectures ought to be given to illustrate every part of a trade, so that every part connected with the trade should be familiar to the workman from the beginning of industrial life. Honours ought to be awarded for efficiency. An upright emulation would by that means be created; and the success of his trade, and his part in it, would then be to the workman a pleasure, instead of, as now, a pain.

Large manufacturers ought at once to set about doing that which employers have already done in foreign countries. The architect of St. Thomas's Hospital, in his account of the buildings, said the iron girders were manufactured in Belgium. Is not that a fact sufficient to set the masters and workmen of this country thinking? In Belgium, economy is a science; there is no waste; everything is utilised. The workmen are intelligent, and the masters and managers know their business. The same thing is done in France and Germany. Although the monster war has to some extent crippled industry, it will, on the return of peace, soon recover. Let the English employer study, now he has the opportunity, the industrial systems of the two countries, and hang models in their workshops and factories, illustrating and showing the different branches of their trades. Something must be done, and that quickly, if England is to make progress, and not be a laggard in the industrial race. True civilisation demands a higher and better state of things than now exist. As physical labour is lessened by science and machinery, the workmen ought to be intelligent enough to take advantage of it. Steam-power, that mighty lever to progress, is gradually abolishing manual labour. More knowledge is required of the workmen. England, it is true, is still industrially great; but it ought to be remembered that her industrial greatness dates back to only four or five generations. Her workmen still possess the qualities, and the country has still the advantages of great natural resources, and all that is wanted to retain the high position which she has hitherto held is, that the workmen should, by education, understand their position, and the duties they owe to themselves. Before it is too late, the order must be given, that the honour of the country requires every man to do his duty.

JACK PLANE.

THE INSTITUTION OF CIVIL ENGINEERS.

AT the meeting on February 14, Mr. Vignoles, president, in the chair, the first paper read was "On the Archimedean Screw for Lifting Water," by Mr. Wilfrid Airy. This communication was intended to supply information regarding the best form of the Archimedean Screw, and its effect when laid at different angles of inclination to the horizon. After suggesting that the previous neglect of this subject was probably owing to the mathematical and practical difficulties attending the construction of screws in the ordinary way,—viz., with the threads at right angles to the surface of the core,—the author stated that he had adopted another principle of forming the spiral threads, which would simplify the work of construction and produce a more efficient

machine. This was to make the spiral threads on the natural and developable system. If an annular piece of card or tin be wrapped upon a cylindrical core, having its edge retained in a shallow spiral groove on the surface of the core, it would naturally take up a fixed and determinate position, not at right angles to the surface of the core, but inclined to it, and inclined to it at an angle depending only upon the inclination of the spiral groove on the core. The core could only be constructed approximately, by using a great number of small pieces. The developable threads also produced a more efficient machine than the threads of the usual form, as was shown by reference to tabular diagrams.

Experiments formed the basis of the investigation, and it was deduced from them:—

1. That the quicker the spiral the flatter must the machine be laid to produce its best effect.

2. That screws of quick spiral angle, when laid at their best angle of inclination, delivered a far greater volume of water per revolution than those of slower spiral angle, when laid at their best angle of inclination.

In the most favourable case, the useful effect of the screw appeared at 88 per cent.; and it was concluded that, after making allowance for certain small losses referred to, the useful effect of a well-constructed screw should not be less than 85 per cent.

Reference was then made, by way of comparison, to other machines commonly used for low lifts,—viz., suction-pumps, centrifugal pumps, open Archimedean screws, scoop-wheels, chain-pumps, and Persian wheels; and the paper concluded by pointing out the various advantages of the Archimedean screw, more particularly as regards its durability, simplicity, and useful effect.

The second paper read was on "Centrifugal Pumps," by Mr. D. Thomson. The practical rules of construction were thus stated:—

1. The arms of the fan were curved backwards, according to principles of construction which were explained by diagrams. The depth of the fan was one-fourth of the diameter, and the central opening for the admission of the water was about nine-sixteenths of the diameter. The space allowed in the case round the fan should be of ample dimensions.

2. The best duty was given when the speed of the periphery of the fan exceeded the velocity of a falling body, due to the height of the lift, by from 6 ft. to 8 ft. per second.

3. A fan 12 in. in diameter, and proportioned as described, would discharge 1,200 gallons of water per minute.

4. If the diameter of the fan was varied (the speed of the periphery and the lift remaining the same), the delivery of water was increased or diminished directly as the square of the diameter.

5. When a centrifugal pump, properly proportioned, was worked by a steam-engine, the duty that might be realised ranged from 55 per cent. in the smaller-sized pumps to 70 per cent. in the larger machines, of the power shown by the indicator diagrams.

A MODEL LOCAL BOARD.

THERE is a little spot in Monmouthshire where the Cymric language and customs are nigh as common as in the heart of the principality. This locality is called Llanfreckfa; and it possesses a local board that deserves to live in history. From the "business" qualities of the whole elect, there is a wonderful harmony of feeling on one point,—doing the best they can for themselves. At a late meeting, a discussion took place about the impolicy of reporting the proceedings of the Board meetings *in full*. Some members complained that the reporter exceeded his duty, and that the minutes of the Board were sufficient to go before the public. The reporter, who was present, stood up, and manfully declared that he would not give a garbled report; that, personally it was a matter of indifference to him whether the proceedings were reported or not; but that, while he attended, he would report *verbatim*, and would not consent to suppress anything that took place. The Rev. J. K. Jenkins thereupon moved that the Press was not, in future, to be excluded, but that the present reporter, Mr. Greene, should not be admitted. Mr. Clark supported the proposition, and it was put and carried.

The reporter, after the motion was passed, took up his hat, and bowed a good-bye to the illustrious group.

Now comes the tale of truck. Mr. Lawrence, the worthy chairman of this model Board, has a vital interest in a Company's shop at Cwmbran, and Mr. Clark, the other voting member, is the gentleman who manages this shop. The latter strenuously advocated that the cinders and slag for the repair of the roads should be supplied by Mr. Lawrence (the chairman). There is yet a more energetic individual, whose blunt heroism deserves honourable mention, and who, if he be not a sanitary reformer, evidently knows a thing or two about drainage matters,—one who carriesoff the palm by boldly declaring, that he would retire forthwith from the Board if he were not allowed to supply the pipes intended for drainage purposes. The sequel is, that Mr. Greene, the reporter, corresponds with Whitehall, and Mr. Tom Taylor replies on the question of supply and demand, reminding the Board of the laws appertaining thereto.

THE LAW COURTS.

SIR,—Mr. Ayrton "doubts not that we shall get a very useful building for the money."

This was said in reference to an arrangement for the erection of the Law Courts for the sum of three-quarters of a million, an amount manifestly inadequate for covering so great an extent of ground, and which simply means, that instead of a Palace of Justice, we are to have "a useful building." We have now an opportunity of adding a grand architectural feature to London, such an opportunity as happens but once or twice in a century, and it appears that the chance is to be thrown away, and we are to content ourselves with "a useful building."

What are two or three millions compared with the creation of a great architectural glory in our city? And what will the citizens of the next century think of our stinginess if we allow so splendid an opportunity to pass by for the sake of a trifle of money? What should we think of our ancestors had they scamped St. Paul's, and left it without a dome, but that they were a mean, parsimonious race, with souls incapable of appreciating excellence? And so will our descendants estimate us if we cramp the architect of the Law Courts in this fashion.

What are the great glories of Venice, of Rome, of Athens? What those of York, Lincoln, and Durham? The marvels of architecture within their walls,—their temples, and cathedrals, and palaces, built not merely to be "useful," but to afford an intellectual gratification by graceful symmetry, grandness of proportion, and beauty of detail, and thither are pilgrims attracted from the ends of the world to gaze upon their beauties. London is not rich in grand structures, and it is to be hoped that in this case the architect may be allowed a little more latitude than seems to be accorded to him, and that this building, which is expected to last until the advent of the New Zealander, may be allowed to rise up in proud dignity between St. Paul's dome and the Victoria Tower, and not be crouched down, by a too careful economy, to the semblance of a warehouse.

F. R.

A FEW REMARKS ON TEACHING DRAWING.

HAVING for some years taken a great interest in the promotion of art, I was glad to see in the report of a recent meeting of the London School Board that it was proposed drawing should be one of the subjects taught in elementary schools. Would it not be a good opportunity for the Science and Art Department to use their influence to get this proposal carried into effect, so that the country might have a real national school of art, and not a mere sham? And this, I venture to say, will not be the case until it is universally taught as a branch of education, the same as it is in Germany. Although there are large sums of money paid for teaching drawing both in our national and private schools, we have little or no results, and this will not be otherwise so long as it is looked upon as "only an accomplishment." It is the fashion to blame the drawing-master for the bad system of teaching usually practised; but it is not his fault: he would gladly carry out a thoroughly sound course of study; but it is impossible; the mammas want a "show," and the pupils will not learn if the master insists, and so he is at the bidding of the pupil, or "his occupation's gone." Most schoolmasters look upon it as a "nuisance;" in fact, Dr. Syntax considers it interferes with his work, and so the lesson must be given in the playhours. The money paid for such lessons as these is very badly invested; it cannot be expected to get much real work out of a boy in his playhours. It is a common practice to keep a boy from his drawing as a punishment for failure in his other lessons! The drawing-master cannot complain to the principal, as it is his order, and certainly not to the parent, for that would be a dire offence; and so, from one cause and another, the study of drawing in this country is uphill work. I will give one illustration. The other day, on visiting a friend whose daughter had just "finished" her education at a fashionable "ladies' college," as she was supposed to have a great talent for drawing, I was shown some of her paintings, which at the first glance I thought very good and clever; but oh, horror! could my eyes deceive me? Was it possible such an insult could have been offered to my sense of everything that was right and true? Yes; they were only tinted lithographs! The shaded drawing is given to the pupil, who tints it from a copy, and this is shown as "her drawing." A label at the back (which had been carefully pasted over with paper) gives the following:—"Drawing copies *specially* adapted for *holiday specimens*." No. —, by —. It is, I think, hardly possible to conceive anything more injurious to the mind of a young person than such a practice as this.

A HATER OF SHAMS.

SAVE WANDSWORTH COMMON.

IN our number of the 23rd July last, a report was given of a large and influential meeting held at the Mansion House, in aid of the collection of a fund for securing the preservation of so much as remains of the above open space, either by carrying on to an issue a lawsuit then pending to try the rights of the lord of the manor, or by coming to an amicable arrangement for the purchase of those rights.

After many meetings, and much discussion between Lord Spencer's solicitors and the committee appointed by the people of Wandsworth and Battersea, an arrangement was effected by which his lordship was to transfer to certain conservators, to be elected by the ratepayers, all his rights over the common in consideration of a perpetual rent of 250*l.* per annum, being just half the amount derived from the digging of gravel and cutting of turf, on an average of the last ten years.

To carry out this project, a Bill has been introduced, in the present session of Parliament, and its promoters had every reason to suppose that it would pass unopposed, seeing that the very trifling rate of ½d. in the pound was the extreme limit to which the ratepayers of Battersea and Wandsworth could be taxed on this account. A petition to Parliament in favour of the Bill was unanimously signed by the Battersea vestry; but the vestry of Wandsworth, acting in concert with the local Board of Works, were of opinion that the common should be dealt with by the Metropolitan Board, and an opposition was accordingly organised with that view. The promoters of the Bill felt that the inhabitants at large by no means concurred in this movement, and a meeting was held at the Spread Eagle, on Wednesday evening last, to test the question.

About 700 ratepayers attended. It was pointed out by the speakers that the Metropolitan Board had been, on two occasions, moved to take steps for the preservation of the common; but had avowed their inability to do so, because there were certain suits pending as to the manorial rights.

These suits the promoters of the Bill have made arrangements for stopping, provided the Bill become law. It was also pointed out that Lord Spencer had made the present arrangements in a great measure as a concession to the wishes of the people of Wandsworth, and that it was not at all likely that he would let the Metropolitan Board have the common on such easy terms, looking to the price proposed to be given for Hampstead Heath, &c.

The great desirability of having the management of the common in the hands of the ratepayers was also strongly insisted on, and ultimately resolutions were adopted by an overwhelming majority, amidst great enthusiasm (only one hand being held up against them), that the Bill now before Parliament for the preservation of Wandsworth Common afforded the best means of securing the object in view, and would, therefore, be beneficial to the inhabitants of the parish; that it was not desirable that

Wandsworth Common should be placed under the care and management of the Metropolitan Board of Works. The resolution further stated that the meeting regretted that that Board should have thought it necessary to oppose the Bill, and so cause money to be spent in Parliamentary strife which would otherwise have been available for the improvement of the common; and deprecated the course taken by the vestry with respect to the Bill, believing that the vestry did not, on this question, represent the opinion of the parishioners of Wandsworth.

COMPETITION FOR NEW BRIDGE OVER THE STOUR AT KIDDERMINSTER.

EIGHTEEN sets of plans were sent in for the above, the estimated cost varying from 480*l.* to 3,000*l.* 4*s.* 6*d.* Three designs have been selected by the committee for further consideration, sent in by Mr. George B. Ford, of Buralem; Mr. T. D. Baker, of Kidderminster; and one under the motto "Modus."

LEAMINGTON CHURCH.

STRENGTH OF MATERIALS.

A VESTRY was held in Leamington Town Hall last week to consider a report by Mr. Clarke, C.E., of London, as to the present condition of the parish church. The Rev. J. Craig presided, and there were twenty or thirty ratepayers present. The proceedings were opened by the chairman, who contended that the slight divergence of the evangelist columns, pointed out by Messrs. Slater and Carpenter, the architects who previously examined the building, was not so serious as many persons had imagined. It was impossible to construct a column which should show no divergence when subjected to a mathematical test, and in the present instance the columns were not out of the perpendicular to such an extent as endangered the safety of the building. He considered that it would be unsafe to proceed with the construction of the lantern tower now; but when sufficient time had been allowed for the columns to subside, and the stone to harden, possibly the completion of the work would be practicable. The report of Mr. Clarke was then read to the meeting. He stated that the weight of pressure on each column was 20 tons per superficial foot, and that alone was sufficient to account for the variations which had taken place in their relative positions. He did not consider, however, there was any evidence of deficiency of strength, so far as the present weight on the columns was concerned; but at the same time they were totally incapable of supporting the lofty tower and spire intended to be placed upon them. With reference to the arches overhead, Mr. Clarke agreed with the opinion of Messrs. Slater and Carpenter, that the stone was of bad quality, and the construction unskilful. The manner in which the stonework and brickwork had been carried out had led to the flushing off of the mouldings. The pressure of the masonry on the *voussures* was nearly eighteen tons per foot, which was much in excess of the ordinary safe proportion. From experiments made with two samples of the stone, he found a pressure of from 62 to 92 tons was required to crush them, and the rule was not to exceed one-sixth of the crushing weight. He thought it was advisable to diminish the present weight on the columns by removing a portion of the superincumbent masonry, and also recommended that the mouldings be redressed and eased at the joints. If that were done, he considered the building would be safe for divine worship.

"GRINDING MONEY."

AT the Westminster County Court on February 21st, an action was brought before Mr. F. Bayley, Judge, by two joiners named Saunders and Stevenson, to recover the sum of 2*s.* each, being two hours' time for grinding tools, and one hour less of time, to claim same from Mr. Charles Fish, builder, Cambridge Wharf, Pimlico. The plaintiffs severally deposed that they had been engaged on a job in Bond-street until Saturday, January 28th, and upon being paid as usual at one o'clock at the defendant's office in Avery-row, their back time was also paid, and they were told that their services were no longer required. They asked for two hours' wages in lieu of time for grinding their tools; but they were told that nothing was known about it there, and if they insisted upon it they had better see Mr. Fish; that on the following Monday they called at Cambridge Wharf, Pimlico, and saw the defendant, who refused to pay any grinding money, and the hour's lost time was claimed for that journey. William Hayling, joiner, deposed that he had been engaged on the same job until a few weeks before Christmas, when he was discharged, and two hours' wages were paid him instead of allowing him time for grinding. In reply to Mr. Smith, solicitor, of Denbigh-street, Pimlico, who appeared for defendant, the witness stated that he was paid by Mr. Cole, the walking foreman. In answer to the Judge, witness stated that he asked for two hours and a half, or a quarter of a day; but that Mr. Cole refused to pay that, and allowed him one hour and a half. The Judge remarked that he had previously stated two hours.

William Pether stated that he had been foreman of the same job, and that plaintiffs were employed under him, and corroborated their evidence as to the discharge. By Mr. Smith.—Was discharged himself at the same time. Believed there was some fault found with the work. Would swear that when Mr. Fish was on the job at twelve o'clock he did not tell him that he would not be wanted after that day, nor that the plaintiffs were to be discharged at one o'clock. Did not tell them they would be discharged. The charge of two hours' wages for grinding was a regular custom of the trade, and had never been demurred to before by the defendant since he had been in his employ. Upon production of the time-sheets, the witness acknowledged that he had sent men's tools out to be ground from time to time to keep them in order as the work proceeded, and charged the same in his weekly accounts.

Both plaintiffs deposed that they had been in the trade many years, and had always been allowed two hours for grinding money.

Mr. Smith, for the defendant, stated that although the claim was for so small an amount, the case was one of great importance, the question of the allowance for "grinding money" having been in abeyance ever since the celebrated "lock-out" or strike in 1859, since which the system of paying by the hour had been adopted, and as a necessity of that regulation notices of discharge or allowances for grinding had been discontinued. He would bring evidence to show that there had been no established custom in the trade, and that whilst some firms made some allowance, the nature and amount varied even in the same employ, and some made no allowance whatever. He read the report of a case similar to the present taken from the *Builder*, of about two years ago, which was heard before Mr. Whitmore, at Wandsworth Court, who decided that there was not such an established custom in the building trade, and gave judgment for the defendant. He then called Mr. Charles Fish, who said that he had been engaged in business about twenty-two years, and that since the lock-out of 1859 he had not allowed grinding money as claimed now. That he knew of no established custom to that effect, but had always set his face against everything of the sort. If Mr. Cole had paid the witness Hayling time for grinding, he had acted without orders. He had not heard of it until just mentioned, and it was therefore quite new to him. Prior to 1859, a quarter of a day had been usually allowed for grinding, but he considered that the hour system did away with it entirely.

Mr. F. T. Mullett (secretary of the Builders' Clerks' Benevolent Institution), deposed that he had been in the service of many firms in the building trade, amongst them Messrs. Hill, Keddell, & Waldram; Mr. William Higgs, Mr. James M. Macey, &c.; that the practice of discharging men varied in each firm, and in the same firm under different circumstances. Had not been with Messrs. Brown & Robinson, but their practice was similar to other firms. Had the entire management of Mr. T. J. Glaskin's business, and had been constantly in the habit of paying men off for years. Had paid many at a minutes' notice, without allowing grinding money. Was in the defendant's employ, and had never received instructions from him to allow grinding money.

His Honour, in giving judgment, stated that he was glad the case heard before Mr. Whitmore had been referred to, as he had a personal knowledge of it, that gentleman having remanded the case to make inquiries as to the custom, had written for his opinion, and asked if he had any evidence upon it. He (the Judge) had in consequence written to several of the largest firms in London, and received replies, each of which varied from the other. He then read letters from Mr. John Kelk, Messrs. W. Cubitt & Co., and Messrs. Geo. Myers & Sons, stating that the custom varied with the firm. Mr. Kelk allowed two hours and a half to all trades; Messrs. Cubitt & Co. allowed two hours to joiners and one to carpenters; Messrs. Myers & Sons allowed two hours to joiners only. In the present case there was the evidence of the plaintiff and the foreman that two hours were the established allowance, but that was contradicted by their own witness, Hayling, who had only received one hour and a half; on the other hand, there was the evidence of the defendant, who had been in the business twenty-two years, and of Mr. Mullett, who knew the practice of several firms, that there was no established custom in the trade. His own opinion was that there was a variety of practices, but no established custom. The charge of one hour for going to Pimlico to make the claim was absurd, and could not be maintained. He should therefore enter judgment for the defendant, with costs.

IN PARLIAMENT.

St. James's Park.—Viscount Royston asked the First Commissioner of Works whether it was his intention this session to open the communication for the public between Marlborough House-gate and Storey's-gate, Birdcage-walk, by the east end of St. James's Park. Mr. Ayrton stated the opinion of the Government that no change should be made in the use of the Park unless it was shown by experience that that change was absolutely necessary to enable hon. members to obtain access to that House.

Natural History Museum, South Kensington.—Mr. Cavendish Bentinck asked the First Commissioner whether Government had approved any design for the exterior architectural elevation of the proposed Natural History Museum at South Kensington; whether the approved design was a modification of that by the late Captain Fowke which was selected after the competition instituted by the right hon. member for South Hants when First Commissioner of Works, and which Mr. Waterhouse was appointed to execute; whether the approved design in architectural harmony with the adjacent new buildings of the South Kensington Museum; and whether he would, as early as possible, exhibit drawings and a model of the approved design within the precincts of that House, for the inspection of members. Mr. Ayrton said considerable progress had been made in the preparation of the plans and designs for the new Museum proposed to be erected at South Kensington; but it would be some time before they were perfected. Until that was done it would, of course, be impossible to exhibit them, nor had they at present received the sanction of the Government.

Labourers' Dwellings in Ireland.—Mr. W. Gregory gave notice that on going into committee upon the 24th of March, he should call attention to the necessity of proper legislation for improving labourers' dwellings in Ireland, and would move a resolution.

Erection of School Buildings.—Mr. Dimsdale asked the Vice-President of the Committee of Council on Education when those managers of schools who have memorialised the Committee of Council for assistance towards the cost of erecting school buildings might expect to receive an answer to the application made by such managers. Mr. W. E. Forster said the only answer he could give was that all applications would be taken in their turn. The applications were of two classes—those for enlargement and those for the erection of new schools,—and they would be taken according to the date of application. He could only say that the officers of the department were doing their utmost to proceed with the work as fast as possible. In the past year there had been 3,300 applications, of which 3,003 had been made within the last few months, and many within the last few days; and he asked the House to bear in mind the extraordinary amount of work which had been thrown on the department since the passing of the Education Act.

Stone of the Houses of Parliament.—In reply to questions,—Mr. Ayrton said that a certain quantity of defective stone had been used in the construction of the Houses of Parliament; and in addition to that misfortune some of the corners of stones had been accidentally broken off and had been repaired by having fresh pieces substituted. As time wore on, all these defects were of course revealed, and naturally created some alarm as to the stability of the building. That alarm, he was happy to say, was unfounded. What deterioration had occurred did not in any way affect the stability of the stonework. Some years ago various experiments were made by different processes with the view of preserving the stone from decay; but, as no consecutive record had been kept of the results, it was impossible to say what had been the strict measure of success. Last year it was decided to make a fresh application of all the processes, and keep a record of the result, the experiments being superintended by a competent chemist. He did not think the results would be absolutely successful, but the greatest care would be taken to achieve a satisfactory result. Should the stones still continue to decay, they would be taken out and fresh ones put in their place, and by that means, at a small annual outlay, he believed the exterior of the building would be kept in a state of preservation for centuries.

BLACK DRAUGHTS.

SIR,

"A smoky house and a scolding wife,
Are two of the direst plagues of life."

There is hope for the former; regarding the latter, hope in vain.

I beg to suggest a terminal be fitted on the brick stack (all unsightly pots on pots, cowls, and many ugly designs to be cleared away): this terminal to be like a revolver of several attendant chambers, but only one shoot-out barrel; four wide-mouthed wind-funnels to receive and discharge air into the tube or barrel, *perpendicular*, without driving against the inside. Forced air always draws an immense quantity of the same after it, and when smoke is intermingled, it readily passes in any direction.

Two doctors (a sweep and a bricklayer) were called in to see three perverse chimneys in my house; they disagreed as to what ought to be done. Dr. Sweep had no faith in extra pots, long crooks, tall-boys, gimcrack windmills, and toppling tops, which choke or come to grief. They operated, and I can say the nuisance is unabated. What is required is an emetic pot to make chimneys bring up the smoke for distribution and consumption among neighbours. The above terminal would maintain an upward draught, and be no impediment to the sweeping-machine.

N.B. During high winds mind your dinner is not drawn up the chimney; nail the hearthrug down, and tie the cat away from danger. If the scolding wife is there, let her take her chance.

R. T.

THE ARCHITECT OF THE LIVERPOOL EXCHANGE.

AT a meeting of the Liverpool Exchange Company, held last week, the chairman of the Board of Directors, Mr. John Torr, moved, and Mr. R. Brocklebank seconded, the following resolution, which was carried unanimously:—

"The works in the architect's department being now entirely completed, the directors desire to place upon record their sense of the ability, zeal, and perseverance with which Mr. Wyatt has devised and carried out the extensive works belonging to the company. The task has been a difficult one, requiring considerable ingenuity in reconciling the requirements of commercial offices with the importance of a large public building. The directors congratulate the shareholders on this problem being solved in a manner so satisfactory to themselves and highly creditable to Mr. Wyatt."

The chairman undertook to forward the foregoing resolution to Mr. Wyatt.

And we have great pleasure in forwarding it to the public.

THE TRAMWAY QUESTION.

Two additional reports on the Street Tramway question, especially as it affects the City of London, have been made by Mr. William Haywood, the engineer and surveyor to the City Sewers Commission, to the Finance and Improvement Committee of the Commission. In the one the reporter thus sums up:—

"I have now, I believe, adverted briefly to the most important points for the consideration of the Commission, and such as may enable them to decide upon the course they will adopt. It will be gathered that, while there are undoubted advantages in street tramways, yet that there are many disadvantages attending them, and there can be no doubt that they will afford much comfort and convenience to a vast number of people; but, on the other hand, that

in streets of great traffic it will no longer be possible to maintain the pavements in a similar condition to that in which they now are; and therefore that the comfort of those who ride in or drive vehicles of another description will be more or less sacrificed to the comfort of those who will ride on the tramways. The travellers in omnibuses are, of course, a much more numerous class than any other, and may become still more numerous should tramways be adopted."

In the other report, Mr. Haywood says,—

"My conclusions are:—

Firstly. That street tramways afford much public convenience, and will shortly be formed along many thoroughfares to the City boundary, that their convenience will be impaired unless they are continued, and that ultimately they will be laid through such of the City thoroughfares as may be best adapted for them.

Secondly. That it is expedient to await their further development in the suburbs before constructing them within the City.

Thirdly. That the local authority itself should devise such a plan of tramways for the City as may be most conducive to the public interests generally.'

Fourthly. That the local authority should itself construct and maintain the tramways, and grant the user of them to others, and take tolls for the same.

Fifthly. That should the local authority deem it inexpedient to construct tramways out of the rates, it should, nevertheless, do the work upon its own plan, and subsequently maintain them as part and parcel of the highway, but at the sole cost of those having the user of them.

Sixthly. That the whole surface of the carriageways in the City upon which tramways are laid should be maintained at the cost of those having the user of the tramways.

Seventhly. That paving the streets with suitable asphalte, where there are tramways, will enable them to be maintained in a condition the least objectionable to the general traffic, and that this should be done at the expense of those having the user of the tramway."

THE NORFOLK-STREET APPROACH TO THE EMBANKMENT.

SIR,—It is to be desired that one of the independent members of the Metropolitan Board of Works would ask why the above has not been completed before this time. The Temple Station on the Metropolitan District Railway has been opened now for eight or nine months, and therefore that railway (which undoubtedly *was* the cause of the Abbey Mills Pumping Station being erected with only one air-chamber to the whole of its pumps, sixteen in number) cannot be charged with delaying lately the opening of the Norfolk-street approach to the Embankment. Why did not the Metropolitan Board of Works build the brick wall they put up near Norfolk-street about last July, with *mortar*, against ———*, against new-made earth, and in that manner keep the mortar of the wall wet till the post came? The building of the wall in this way would have been of considerable advantage. JASPER.

* I regret that I cannot think of the name of the stuff which would in these circumstances keep mortar wet for six months. Will some one kindly tell me the name?

SLATE CISTERNS.

REFERRING to your correspondents, there cannot be any bastard slate slab made into cisterns.

I have used slate cisterns over W.C., and by only painting the outside bottom, no "mist" or "dampness" will ever adhere or get attached to it. Without doing this, the least opening to admit the atmosphere will always produce what is erroneously called "leakage" or "sweating." Slate cisterns painted on the insides make the best bread and flour safes. R. WILLIAMS.

CHARGES AGAINST A CLERGYMAN AS TO A BRICKFIELD.

THE Justices of the Peace for Faversham, Kent, after an investigation at the Sittingbourne Police-station, which extended over three days, have committed the Rev. William English, formerly the vicar of Milton-next-Sittingbourne, but now residing at Emmanuel Vicarage, Camberwell, to take his trial at the next assizes, to be held at Maidstone, on various charges of perjury, and suborning and inciting others to commit perjury. Mr. Evans conducted the prosecution, and Mr. Serjeant Sleigh appeared for the defence. The proceedings were taken by Mr. Peter Bawden, a brickmaker and patentee of some brickmaking machines, residing at Notting-hill. From his evidence it appeared that in 1868, in consequence of seeing an advertisement that a certain brickfield in the neighbourhood of Rainham was for sale or hire, he went down to that place, and met the defendant, the Rev. W. English. He visited the brickfield in the company of the defendant, who represented that it contained earth capable of making the best bricks in the neighbourhood. From the representations made by the defendant he was induced to hire the field, one clause in the agreement being that he should pay a royalty for 4,000,000 bricks every year, whether he made that quantity or not. It was declared by several respectable witnesses that the earth in this field was not capable of making marketable bricks. A clamp of bricks was standing in the field at the time in question, which defendant alleged had been made from the earth of that particular field, whereas it was proved that many of the bricks which were placed outside the clamp, and were of a far superior quality to those in the interior, were made from earth specially carted for the purpose from another field. The bricks made from the earth of the field hired by Bawden were said to be positively useless. Bawden consequently sued the defendant for obtaining from him a valuable security by fraudulent pretences in respect of this field, and the action was tried at the Maidstone Spring Assizes in 1870. Defendant was then examined as a witness, and, in consequence of his having, as it was alleged, sworn falsely at that trial, a verdict was entered for the defendant. Subsequently a rule *nisi* was obtained in the Court of Queen's Bench for a new trial. The arguments were heard before the Lord Chief Justice, who refused to grant the application. The present proceedings were then taken. The evidence of witnesses called went to show that at the trial at Maidstone the defendant, when upon his oath, had sworn that he was not alone with the plaintiff in the brickfield when the representations were made which induced the plaintiff to take the field; that he never instructed any person to make a clamp of bricks regardless of expense, and no matter where the earth came from, in order to enable him to let or sell the field; that Major Bursiem, a former tenant of his, had never complained verbally or by letter that this earth was bad; that he (defendant) believed the earth was capable of making good bricks; that he never told one Amos that he was in no hurry to sell the clamp of bricks because he wanted to keep it there to enable him to sell or let his field; and that he never communicated with his witnesses during the trial, telling them not to say anything that would contradict his evidence, nor had he incited Alfred Butler and George King to make certain false statements in affidavits on his behalf. All these statements were now alleged by the prosecution to be false. Bail was accepted, himself in 1,000*l.* and two sureties in 500*l.* each.

THE PUGIN TRAVELLING STUDENTSHIP.

SIX candidates submitted drawings and testimonials to the Institute of Architects for the Pugin Travelling Studentship, and the Council elected from them Mr. William Henman, of Bedford Villas, Croydon, as the student for 1871.

SONNING, OXFORDSHIRE.

A PARSONAGE-HOUSE has been recently erected in the district of All Saints, in the parish of Sonning, Oxfordshire, the cost of which has been defrayed and the site provided by Mr. Robert Palmer, of Holme Park, Berkshire, on whose estate the parish of Sonning, Berks and Oxon, is chiefly situated.

In the year 1841 Mr. Palmer gave the land, and, in conjunction with his sisters, the Misses Palmer, erected the district church of All Saints; and between that and the present time they have provided schools and teachers' residences also for the district. The parsonage might, perhaps, be considered as a completion of the group. All have been erected under the direction of Mr. John Turner, architect, of London, with whom, in the case of the parsonage, has been associated his son, Mr. J. Goldicutt Turner.

The materials used are grey and red brick and tiles. The works have been executed by Messrs. Brown, Cox, and Green, of Sonning, who have performed the trades of plumber, carpenter, and bricklayer respectively.

SCHOOLS OF ART.

The Macclesfield School of Art.—A meeting of the committee of this school has been held to receive the report of a deputation which had recently waited on Mr. Cole, the secretary of the Science and Art Department, South Kensington Museum. The deputation stated, at considerable length, the nature of the interview with Mr. Cole, the result of which was satisfactory to the committee; and plans for a new building were ordered to be prepared by the art master, Mr. J. Ford, to be submitted to the Government. As an evidence of the interest felt in the silk trade of Macclesfield by Mr. Cole (who represents the Government), it was stated that even the maximum Government grant for a new school would be increased, provided this town manifested a determination to have a new school, and to support it in efficiency when erected. The feeling of the Government, as represented by the Department of Science and Art, appeared to be that a silk or manufacturing town should have a good school for the promotion of taste, art, and design. The meeting was adjourned to inspect the plans, prior to their being sent to the Department for consideration.

The Sheffield School of Art.—This annual gathering has taken place with great success. Whether it was the attractive works of art, got together by Mr. Sounes and the Council of the School at much trouble, or genuine interest in the institution itself, that drew together so large and gay a company, our authority, the *Sheffield Independent*, is not prepared to say. Mr. George Dawson addressed the meeting, and in course of his speech he said:—Did it ever strike you to think of what man must be in his savage state? What a poor, little, helpless, queer biped he looks. A wicked satirist called him once a forked raddish with a curiously carved head. *We* are sent into this world not like that, because we come richly dowered by many generations of culture; but think of your barbarian forefather as he stood on this earth with no furniture whatsoever—not even a pocket to put anything into. But so it pleased the Almighty. He made man stark naked, and ugly, knowing nothing whatsoever, but having a certain amount of intellect. But what a wonderful development he had come to. This curious little biped, apparently helpless, is the most helpful creature in creation. He soon makes for himself a covering; then he makes for himself a pocket, and a pocket is one of the greatest things that civilisation and art ever achieved for a man. You must have a knife in order to live, and if you have no pocket, where are you to put your knife? You cannot carry it between your teeth conveniently for long. So, by degrees, man begins to cover himself, and then the wonderful little person wants to be where he is not. He cannot swim until he learns, and when he learns he does it well; he cannot fly, and he makes a balloon, and by and by he will succeed in that matter admirably. He wants to be where he is not, and he invents a bow and arrow. The flight of the arrow is very short, and by and by he invents a gun, and he is enabled to hit his enemy without going near him. And in these deadly days of detestable slaughter men are enabled to stand here and act five miles off. Man has, however, few years to live in, and he conquers that by producing a library where the thoughts of all ages are gathered together, and this poor little creature of three score years and ten is able to commune with the most ancient days. At a very early period in his life man shows a sense of beauty. He dyes perhaps the last pattern of fashion into his own face in blue mould. The savage very soon becomes ornamental, and that love of beauty you may look upon as one of the great instincts of humanity. Now art is systematic in the pursuit of beauty. Beauty is marked upon every work of God, and, therefore, the love of beauty is simply the fulfilment of the Divine method; and if you will look into nature a little, you will find no mere poor vulgar utility in it. The great architect of the universe never made a single work yet in which vulgar utility was simply the measure of production. One man says "Beauty is only skin deep," therefore it is nothing. "Well," I say, "you fool! who ever expected it to be any deeper? The marvellousness of beauty is, that being only skin deep, it is so deep. It is only skin deep, and though you bray, who can stand against beauty? Graceful men and graceful women are a power wherever they go."

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A SPECIAL general meeting, of members only, will be held on the 6th of March, to consider the recommendation of the council, that the royal gold medal be awarded, subject to her Majesty's gracious sanction, to Mr. James Fergusson; that the Soane medallion (with the sum of 50*l.*) be awarded to the author of the drawings distinguished by the device of a "horse-shoe;" that the Institute silver medal, with 5*l.* 5*s.*, be awarded to the author of the drawings distinguished by the word "Student" within a triangle; and that the Institute silver medal be awarded to the author of the essay bearing the device of "two leaves within a circle." The meeting will also be requested to consider a resolution passed by the Professional Practice committee, and since adopted by the Council, respecting the "terms of appointment of architects for public buildings," issued last year by the Office of Works; to confirm, if approved, the "general headings for clauses of contract," as settled between the Council of the Institute and the Committee of the London Builders' Society; and to take into consideration the suggestion made in the president's opening address for the present session, as to the office of secretary. A communication respecting a proposed scheme for an annual conference of architects, to be held at the Institute, will also be submitted to the meeting. Plenty of business, certainly, for one night.

Books Received.

Laxton's Builders' Price Book for 1871. London: Kelly & Co.

THE current edition of *Laxton's Price Book* contains a considerable amount of fresh information. Parts of it have been rearranged, and a large number of prices added of modern inventions and recent novelties. Besides the whole of the Building Act, there are notes of cases explanatory of its working. In short, it is a book to have.

VARIORUM.

THE editor of the *Leisure Hour* is giving some interesting and valuable observations on America and its people. Speaking of the general use made of the electric telegraph, he says,—"Another curious instance I may mention of the use of the telegraph in the details even of indoor life. In the hospital at Cincinnati I saw a bureau in the hall, in charge of a smart coloured boy. Wires centred in this office from all the wards, and every hour the temperature in each ward was telegraphed by the head nurse, and entered by the clerk, for the inspection of the medical superintendent, whose room was adjoining. In many private as well as public establishments the telegraphic arrangements are equally complete. The Americans know how to make the most use of electricity, as well as of steam." As to the arrangement of houses in New York,—"One thing I specially noticed, that the basements are far more carefully constructed than in our London houses. I was in the basement of various stores, and, even in low-lying streets like Canal-street, the arrangements were all that could be desired for health and business convenience. In London, while looking in at shop-windows, one is saluted with pestilential odours from the open grating above the dark subterranean ground. In New York the ground floor is usually light and wholesome. With our skill in glass and iron work, a great improvement could surely be made in the basement floors of our business streets. I suspect, however, that the land and property laws partly account for the more careful building in New York. What interest has a tenant in London to erect a building to last much beyond the term of a lease, when the building then becomes the property of the ground landlord? *Sic vos non vobis ædificatis.*"——The *Dark Blue* (Sampson Low) is a monthly magazine, intended to be connected with Oxford and Oxford men,—at least, for a time. It is conducted by Mr. J. C. Freund, and has commenced fairly well. Several well-known men are amongst the contributors. Some enterprising publisher will, doubtless, soon organise the *Light Blue*, in the interests of Cambridge, and in due time every line of the spectrum will have its representative journal, the London University possibly winding up the list with the *Deep Read.*——*London Society*, now edited by Mr. Henry Blackburn (Bentley & Son), has taken a fresh start. The number for March is a good one.——In *Fraser*, Mr. R. A. Proctor gives further account of recent discoveries, under the heading, "The Sun's Corona." The paper on Barham (Ingoldsby) is sure to find readers.

Miscellanea.

Monster Blast at Granite Quarries.—It is estimated that 80,000 tons of rock have been thrown down by one blast at the Bonaw Quarries, near Inverary, in Scotland. Preparations have been in progress during the past eighteen months for this blast. The fineness of the day induced considerable numbers of the country people to take up their position upon various safely distant points of view on the hills surrounding Loch Etive. A rough protecting house was formed for the battery at a point 100 yards from the mouth of the mine, and on the same level as the quarry floor, along which the conducting wires were laid till they formed a junction with the battery near to the site of the quarry at the shipping quay. From this point Mr. Sim, of Glasgow, the proprietor, crossed Loch Etive to the Goat Island—200 yards distant—with the working cords of the battery. Here he found a desirable place for shelter from flying stones. From his position he was also enabled to obtain a near view of the working of the blast. In the firing there was no report or noise, merely a silent heaving of the mountain, bursting and pressing forward innumerable pieces of rock from the formations in which they had existed in their natural state. The quantity of rock displaced is enormous, being computed by measurement at 80,000 tons, constituting this blast the largest and best which Mr. Sim has had during his 18 years' experience of this peculiar system of blasting.

Somerset County Lunatic Asylum Chapel.—We have received a letter on this subject, signed "X. X. X.," complaining of excess of cost and other things; but we do not feel it necessary now to carry the matter further.

The Proposed Euston, St. Pancras, and Charing-cross Railway.—A public meeting of the owners and occupiers of land and houses lying along the proposed line of construction of the above railway has been held at Caldwell's Assembly-rooms, Dean-street, Soho, Mr. Milnes in the chair, to adopt measures for procuring the insertion of a clause in the Bill compelling the railway companies in whose immediate interests the line was to be made, to give compensation to all those whose property or business might be damaged by the construction of the line. The chairman stated that hundreds of tradesmen and shopkeepers in the New-road and other localities were completely ruined during the progress of the works of the Metropolitan Railway, and therefore the inhabitants of Tottenham-court-road, Soho, and St. Martin's-lane, were fully justified in taking measures to protect their interests. A resolution was adopted in favour of steps being taken for protecting the interests in question, and a petition to Parliament for that end was signed by nearly all present.

The Albert Hall of Arts.—On Saturday last a concert was given to the workmem employed in the erection of the Royal Albert Hall of Science at Kensington-gore, by Messrs. Lucas, the contractors. The hall was, in addition, occupied by a large number of ladies and gentlemen, the entire audience numbering over 8,000. The instrumental performers were the band of amateurs known as the Wandering Minstrels, under the conductorship of the Hon. Seymour Egerton, and the soloists, Mrs. Nassau Senior and Miss Anna Williams. The programme included the overtures to *Masaniello*, *Zampa*, and *William Tell*, the march from *Tannhauser*, and some waltz music. The effect of Gounod's "Prayer," as sung by Miss Williams, was particularly fine. Difference of opinion exists, according to position of listeners, as to the existence or not of an interfering echo. Before determining, we are disposed to wait till the hangings of the boxes and other fittings are in their places. In several respects this first experiment of filling the Hall must be pronounced satisfactory.

The Carpenter's Shop.—A professor at Munich, says the *Cornish Telegraph*, has published the results of his experience on the seasoning of wood, which, as a practical question, is worth attention in many quarters. Growing-wood, says the Professor, contains in winter about 50 per cent. of water; in March and April 46; and 48 per cent. sent in the next three months, with but little variation up to November. Timber dried in the air holds from 20 to 25 per cent. of water: never less than 10 per cent. Wood dried by artificial means until all moisture is expelled, is deprived of its elasticity, and becomes brittle. If the natural qualities of the wood are to be preserved, the drying must begin at a moderate heat, and be carried on very slowly. For the drying of small pieces of wood, such as are used by joiners and cabinet-makers, the Professor recommends a bath of dry sand, heated to a temperature not exceeding 100°. The sand diffuses the heat, and absorbs moisture; but it must be cold when the wood is first buried therein.

A Testimonial.—On the 27th ultimo the clerks and foremen in the employ of Messrs. Patman & Fotheringham, builders, met at the Albion Tavern, Southampton-row, for the purpose of presenting to Mr. James B. Colwill, on his leaving the firm to commence business on his own account, a gold chain and a complimentary address, which bore the signatures of 23 subscribers. Mr. Wm. Richardson acted as chairman on the occasion, and Mr. Wm. Skill as vice-chair. The former accompanied the gift with a few kindly and well-chosen remarks, to which Mr. Colwill responded, avowing his high appreciation of the present, and still more of the friendly feelings by which the donors were actuated.

Cottage Hospital for Consumption.—The Fancy Bazaar to be held in the Duke of Wellington's Riding School, Knightsbridge, in aid of the National Hospital for Consumption, on the separate or cottage principle, erected near Ventnor, Undercliff, Isle of Wight, is fixed to take place on the 11th, 12th, and 13th of May, 1871, in anticipation of the completion of the third pair of houses now being erected at the entire cost of two gentlemen, and for the purpose of obtaining funds to defray the expense of furnishing and opening these houses for the reception of patients.

Building Operations in Walsall.—During a general ramble round Walsall, with note-book in hand, the *Walsall Observer* has dotted down his thoughts on several of the buildings and other works executed during the past year. He was not aware, he says, that so much had been done during the time. First he notices the new church at Caldmore, St. Peter's Schools, and the Church Schools at the Butts. The first is incomplete; want of funds to carry out the aisles completely spoils both the internal and exterior appearance. Mr. Veal is the architect, and the builder Mr. Lovett, both of Wolverhampton. Of St. Peter's School, Mr. Chamberlain was the architect, and Mr. Atkins the builder. These schools have been recently opened. The Butts Church School was designed by Mr. Griffiths, of Stafford, and is being built by Mr. Wilkes, of Darlaston and Walsall. The *Observer* then notes particulars as to numerous villas and other houses, &c., and says, "We sincerely trust that all intending builders of houses will avail themselves of the services of some person of skill and taste, so that our suburbs may not be disfigured by such a tasteless and incongruous mass of erections as at the present."

The New River Company and its Property in Hertford.—At a meeting of the Hertford Council, Councillor Garratt, in moving that a committee be appointed to report upon the rateable value of property belonging to the proprietors of the New River Company, within the borough of Hertford, said the New River Company sends to London a daily supply of 26,500,000 gallons of water, from which it receives, by the sale annually, the sum of 252,000*l.*, or equal to more than 9,300*l.* per annum for every 1,000,000 gallons supplied daily. Chadwell Spring contributes to that quantity 4,500,000 gallons daily, which is equal to one-sixth, and a trifle over, of the whole supply. The total expenses of the New River, including working expenses, rates, taxes, income-tax, &c., amounts to 119,000*l.*, leaving a net profit of 133,000*l.* Taking one-sixth of that sum as the profit of the New River from the Chadwell Spring, it amounts to 22,166*l.* 13*s.* 4*d.*, which profit is derived from this borough. About 18,500,000 gallons were daily taken from the River Lee, which flows through the borough, and which produces a profit of about 100,000*l.* per annum after working expenses, rates, taxes, income-tax, &c., are paid. The motion was agreed to.

Effect of Cheap Railway Fares.—The chairman of the North-Eastern Railway Company (Mr. H. S. Thompson) made an interesting statement at the annual meeting of the shareholders on Friday. The result in twelve months of a reduction of from 20 to 25 per cent. in their fares had been an increase of 54,158 first-class, 154,122 second-class, and, 1,179,000 third-class passengers. The aggregate receipts of first-class fares showed a loss of 87*l.*; but, on the other hand, the increased receipts from second and third class passengers amounted to 9,423*l.* and 34,191*l.* respectively.

The War and the Railways.—The reduction in the receipts of the South-Eastern Railway during the past half-year, caused by the war, was 66,000*l.* The capitulation of Paris had such an effect on M. Petiet, the managing director of the Great Northern Railway of France, that he succumbed to an attack of apoplexy. The public were indebted to M. Petiet and Mr. Eborall for the introduction of the system of through booking between France and England.

The Fatal Sewer Accident at Mile-end. An inquest has been held on the bodies of the three men suffocated by the fall of earth, while excavating, on Saturday week, at the bottom of a new sewer in Paul's-road, Mile-end. The sewer was 25 ft. in depth, and the sides of the cutting were composed of clay and sand, through which the water oozed. Some witnesses deposed that the sides were not properly strutted, and that the foreman had been remonstrated with. The jury returned a verdict of "Accidental Death, resulting from the insufficiency of the strutting of the sewer." The jury requested the coroner to censure Mr. Hubbard, the foreman of the works.

Monumental. — The marble statue of Abraham Lincoln, of which Miss Vinnie Ream was the sculptor, was unveiled in the presence of the President and Congress, on the 25th of January, in the Rotunda of the Capitol at Washington.

The Annual Trades Congress.—Messrs. G. Odger, W. Harry, G. Howell, G. Potter, and W. Cremer, the committee in whom the last Trades Congress, held at Birmingham, vested the authority for convening the next congress to be held in London, on Saturday last issued a circular to every trades council and trade society throughout the United Kingdom, informing them them that the Congress was convened for Monday, March 6th, at eleven o'clock, at the Portland-rooms, Foley-place, Fitzroy-square, and inviting them to send delegates. The sittings of the Congress are expected to last for the whole week. The programme contains the following subjects for discussion:—1. Trade-unions and Legislation. 2. Mines Regulation Bill, the Truck System, and Weekly Payment of Wages. 3. Employment of Women and Children in Agriculture, Workshops, and Factories. 4. Convict Labour *v.* Free Labour. 5. Application of Arbitration and Conciliation in Trade Disputes. 6. Reduction of the Hours of Labour. 7. Co-operation and Industrial Partnerships. 8. Taxation, Imperial and Local. 9. Education, Primary and Technical. 10. Direct Representation of Labour in Parliament. 11. International Fraternisation of Labour. 12. War, Standing Armies, and their Injurious Effects upon Industry. 13. Utilisation of Waste Lands and Unemployed Labour. 14. Emigration as effecting Working Men. 15. The Commission Appointed to inquire into the working of Friendly Societies.

Explosion in the Chartered Gasworks.—At the works of the City of London Chartered Gas Company, near Barking, one of four enormous gasometers had risen as high as it could upon the columns supporting it, when, apparently from its being overfilled, and by the force of a gale of wind, the supports or columns gave way, and the gasometer tilted on one side, which had the effect of letting the gas escape. The volume of gas was blown by the wind to a distance of about 100 yards into a blacksmith's forge, the fire of which is supposed to have ignited it. The result was a terrific explosion, the sheet of flame extending high into the air, and being visible for miles around. The workmen, on seeing the columns give way, ran off, and before the gas became ignited had got beyond reach of danger. Except damage to the gasometer and loss of the gas, which was considerable, no serious injury was sustained. Fortunately the wind was in the direction to blow the gas away from the other three gasometers. Portions of the gasometer were doubled up like a roll of carpet, and the pillars were broken down.

Proposed New Public Buildings, Bilston. Mr. Taylor, town surveyor, has prepared a plan showing the accommodation which buildings erected on the site just purchased by the Commissioners will afford to the town. The piece of land proposed to be appropriated to the purposes of a free library will hold a building comprising a library, 21 ft. by 9 ft.; and reading-room, 35 ft. by 21 ft. The town-hall will afford space on the lower floor for the undermentioned rooms:—Committee-room, 21 ft. by 14 ft.; board-room, 21 ft. by 18 ft.; clerk's office, 14 ft. by 21 ft.; surveyor's office, 21 ft. by 14 ft.; collector's office, 14 ft. by 20 ft. The upper floor, according to the plan, will comprise:—Town-hall, 52 ft. by 64 ft.; ante-room, 18 ft. by 12 ft. 9 in; cloak-room, 9 ft. by 12 ft.; retiring-room, 18 ft. by 12 ft., together with lavatories closets, &c. The Commissioners have resolved that the town-hall and free library shall be of one style of architecture.

Oxford Architectural Society.—Merton College was visited on Saturday last, when nearly a hundred of the members and their friends were present. The party then went into the gardens, and visited the city wall, when some interesting particulars were given by Mr. J. Parker, who said that the probable date of its construction was about the middle of the reign of Henry III. The party then visited St. Alban Hall by the kindness of the principal, and, returning to Merton College Gardens, went out by the gate facing the meadow, and traced the course of the city wall.

Cameo Cutting.—We are sorry to hear that none of the students of the Female School of Art have responded to the offer of a premium for the best cameo produced in the school, as announced at the last general meeting. The proposer has authorized the committee to offer the amount as a prize in such other form as they may determine.

Railways on Suspension Principle.—The Melbourne *Argus* says,—In the London *Engineer* of 30th September, 1870, there is a description of a new and cheap railway on the suspension principle, designed by Mr. J. B. Fell, the engineer who is so well known in connexion with the construction of the Mont Cenis line across the Alps, and it is stated that by this plan practicable railways, which may be worked either by locomotives or by an endless rope, can be made at a cost of 1,000*l.* per mile. It is somewhat remarkable that a precisely similar scheme was brought into notice here two years ago by Mr. Joseph Dyer, and that this gentleman then associated it with Mr. Fell's discovery of traction by adhesion to a central rail. Mr. Dyer had previously laboured hard to introduce the same plan in New South Wales, and had spent thirteen years in advocating it there. In 1857 he declared that he could make railways for 1,000*l.* per mile, but was always met with ridicule. He now entertains the hope that the weight and authority of Mr. Fell's name will lead to the trial out there of some practical experiment with this new form of railway.

Tramways for the City.—The Court of Common Council, sitting at Guildhall, have had under their consideration the question of allowing tramways to enter the City; and Mr. De Jersey, the chairman of the Commissioners of Sewers, brought up a report from that body, which has now the care and the maintenance of the highways of the City, recommending that it be constituted the authority for carrying out within the City the powers of the Acts of Parliament relating to street tramways. It was eventually resolved that the court petition Parliament on the subject, in order that they might thereby have a *locus standi* there, and should be able to modify the provisions of any such Bills in the interest of the City. The Commissioners of Sewers, by whom the report was presented, expressed themselves in favour of the introduction of tramways into the broader streets of the City.

Spongy Iron as a Deodoriser.—There is some mystery in the spongy form of metal and other substances, not yet cleared up. Spongy platinum is a substance with curious properties, and the spongy form of charcoal seems to have something specially to do with its deodorising power. Dr. Voelcker now declares spongy iron to be a deodorising material of greater power than animal charcoal. Sewage water passed through a filter of this substance is said to be completely purified, and this filtered water, after having been kept six months protected by the air, has been found to be perfectly sweet, and free from any fungoid growth. The spongy iron is obtained by calcining a finely divided iron ore with charcoal. Mr. Spencer, of London, but once of Liverpool, whose name is connected with the discovery of the electrotype, has for some time been advocating the use of a filter of this description.

Wrought-iron Sleepers.—A new railway sleeper has been patented by Mr. Richard Gammon, of Westbury. This sleeper is made up of a number of webs and plates of rolled iron, riveted together, and pierced with bolt-holes for the chairs. This saves about two-thirds of the labour in laying, and leaves but little work to be done by labour. The direct cost is said to be not more than 1*s.* each above that of the best wooden sleepers, while they are calculated to last ten times as long in tropical countries, and three times as long in Europe.

Opening of Staines Bridge.—On Saturday Staines-bridge was thrown open free from toll. The ceremony was of a very simple character. The inhabitants of Staines, to show their appreciation of the efforts of the joint committee, and of the benefits which will result to the town and neighbourhood, invited the members of the committee to a public *déjeuner* after the opening. Colonel Challoner presided, and General Wood occupied the vice-chair.

Safety of Railway Travelling.—Although 9,500,000 passengers had been carried over the South-Eastern Railway, not a single accident was reported on this line in the Board of Trade returns for the past year. They ran 666 trains per day, which stopped and started 4,083 times during the twenty-four hours.

The Trades Movement.—The joiners of Edinburgh have held an aggregate meeting, and resolved to resist any attempt to further reduce their wages.

Edinburgh Architectural Association.—At a meeting of this Association, held in the hall, 5, St. Andrew-square, on Wednesday, the 15th ult., a paper, by Mr. Wm. Richardson, was read, on "The Architects and Architecture of the Present Day." The writer condemned the practice of taking a number of pupils for merely selfish purposes, and urged that an architect should adhere to one style only.

The Trade-Union Bill.—At an adjourned meeting of the Conference of Amalgamated Trades, the report of a sub-committee appointed to consider the provisions of the Trade-Union Bill has been adopted. The principal recommendation was, that the third or criminal clause be expunged, on the ground that it would be unjust and exceptional in its operation.

The Drinking Fountain Movement.—A marble fountain at Newbury, presented by the Baroness Weld, in accordance with the intention of her late husband (Mr. Winterbottom), has been opened for public use with very little ceremony. The fountain stands at the junction of the Southampton and Andover roads, on the site of some dilapidated cottages which disfigured that approach to the borough.

The Market Hall, Whitchurch.—At a special meeting of the local Board, the contract for the building of the new market hall was entered into. Fourteen tenders had been sent in. After some discussion the tender submitted by Mr. J. Stringer, of Sandbach, builder, was accepted. The amount of this is 5,910*l.*, including fixtures. The work is to be begun soon, and finished in twelve months.

The Post-office.—Sir: I read, in this week's *Builder*, some observations in explanation as to whom the *credit* (?) of the design of the New Post-office in St. Martin's-le-Grand is due? Can the same authorities tell us to whom the *credit* (?) should be given for the addition over the central portico of the older building—the present Post-office on the other side of the way?—Z.

Architects' Benevolent Society.—The annual meeting of this Society will be held at the House in Conduit-street, on Wednesday, the 8th instant.

Sculpture.—Mr. G. G. Adams has recently executed a bust of Lord Brougham in marble, which has been placed in the Council Chamber at Guildhall.

TENDERS.

For Cobham Park, Surrey. Mr. Edward M. Barry, R.A., architect. Quantities supplied by Mr. J. H. Strudwick and Messrs. Strudwick & Mennie:—

Cubitt & Co.	£31,415 0 0
Lucas Brothers	30,900 0 0
Haward Brothers	29,874 0 0
Trollope & Sons	29,343 0 0
Smith & Co.	28,927 0 0
Shearburn	28,530 0 0
Holland & Hannen (accepted)	27,700 0 0

For building a new chancel, vestry, and organ-chamber to the district church of Christ Church, Warminster. Mr. T. H. Wyatt, architect:—

Revised tenders.

Seamell & Pontin	£771 16 0
Strong & Searchfield	736 0 0
Parsons & Dutch (accepted)	724 7 0

For villa residence at East Sheen (exclusive of stabling). Quantities supplied by Mr. Gandy. Mr. E. Ingress Bell, architect:—

Sharpington & Cole	£2,283 0 0
Adamson & Sons	2,122 0 0

For additional story to St. Matthew's Schools, City-road. Mr. Lacey W. Ridge, architect. Quantities by Mr. L. C. Riddett:—

Hill & Sons	£698 0 0
Dove Brothers	685 0 0
Williams	633 0 0
Roberts	594 0 0
Capps & Ritso	584 0 0
Scrivener & White	568 0 0

For the erection of a paper warehouse in Farringdon-street. Mr. Lewis H. Isaacs, architect. Quantities supplied by Mr. L. C. Riddett:—

Axford	£2,375 0 0
Adamson & Sons	2,349 0 0
Scrivener & White	2,288 0 0
Capps & Ritso	2,272 0 0
Elkington	2,249 0 0
Browne & Robinson (accepted)	2,190 0 0

For the erection of Parsonage House, Lyonsdown, Barnet. Mr. Phillip H. Peters, architect:—

Linzell	£2,220 0 0
Bird	2,148 0 0
Scrivener & Stevenson	1,900 0 0
Pocock	1,870 0 0
Brown & Sons	1,650 0 0
Walton	1,612 0 0

For new town-hall and markets at Whitchurch, Shropshire. Mr. Thomas M. Lockwood, architect :—

	Building.			Fittings.		
Samuel	£7,178	0	0	£378	0	0
Meakin & Sons	6,687	0	0	387	10	4
Orchard	6,669	0	0	400	0	0
Powell & Co.	6,560	0	0	376	10	0
Yates	6,439	0	0	312	0	0
Price	6,250	0	0	350	0	0
Cobb	5,997	0	0	383	0	0
Millington & Son	5,900	0	0	352	0	0
Andrews	5,808	18	0	286	9	0
Binnian & Son	5,685	0	0	310	0	0
Readdie	5,640	0	0	349	0	0
Stringer	5,637	6	0	272	14	0
Wade Brothers	5,400	0	0	400	0	0
Burkett	5,430	0	0	313	0	0

For alterations at Bromley Palace, Kent. Mr. Banks, architect :—

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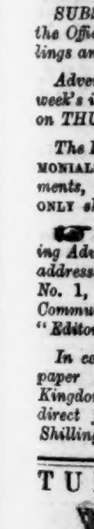

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